

# The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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## English Forgings and American Castings.

While English blacksmiths greatly excel their fellow-craftsmen on this side of the water, it is universally conceded that American foundrymen and machinists are much more skilled than their English cousins. The art of casting has been brought to such a degree of perfection in this country that cast iron is successfully used in places where the English engineer would never dream of employing that material. This success with cast iron no doubt accounts in some measure for our

means of dies, so as to be ready to receive the inner ends of the arms or spokes. These are in turn welded in position, and after all are placed a final heat is given to the parts in order to give the whole a finish under a drop in which are placed suitable dies. The rim of the wheel is of wrought iron, and is formed of the proper size and welded. A heat is then taken upon it, and also upon the ends of the several arms or spokes, when the two parts are brought together in proper position by means of suitable apparatus, and the several welds necessary to complete the wheel are made. The very best facilities for

cheap labor. Must the Italians go? In Brazil, the great market for Italian labor of late, the demand appears to be supplied.

## The Porter-Allen Steam Engine as Applied to Rolling Mills—II.

We give this week details of a P. Allen rolling mill engine of the largest order. They are of much interest, even to those familiar with the smaller sizes, as the proportions vary greatly. For example, the shaft of one of the largest of these engines,

inches wide. The crank disk has two keyways 25° on each side of the center line of the crank-pin. On its inside face the crank disk has a projection 3 feet in diameter, the edge of which forms a semicircular groove, with a lip projecting a little, as is shown in the section Fig. 4. Upon this lip the oil working from bearings comes, and, by centrifugal force, is thrown outward and prevented from working inward along the groove and so out upon the disk. The disk itself is 6 feet in diameter, and opposite to the crank-pin is thickened from 3 to 7 inches, in order to furnish the proper counter-

fore being set in the cross-head. (See Fig. 7.) The bearings of the connecting rod and also the main journals are lined, as in all these engines, with Babbitt metal, not, however, of the kind usually found in the market, but the original composition of copper, tin and antimony invented by Mr. Babbitt. This material seems to be working its way into favor with our young engineers, who are fully awake to its numerous advantages.

The cross-head, Fig. 11, is of cast iron finished all over, is 3 feet long and has bearing surfaces 30 inches in length. The piston rod goes into a taper hole and is secured by

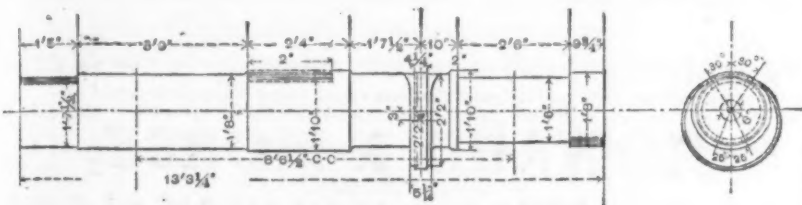


Fig. 1.—The Crank Shaft.—Side and End View.

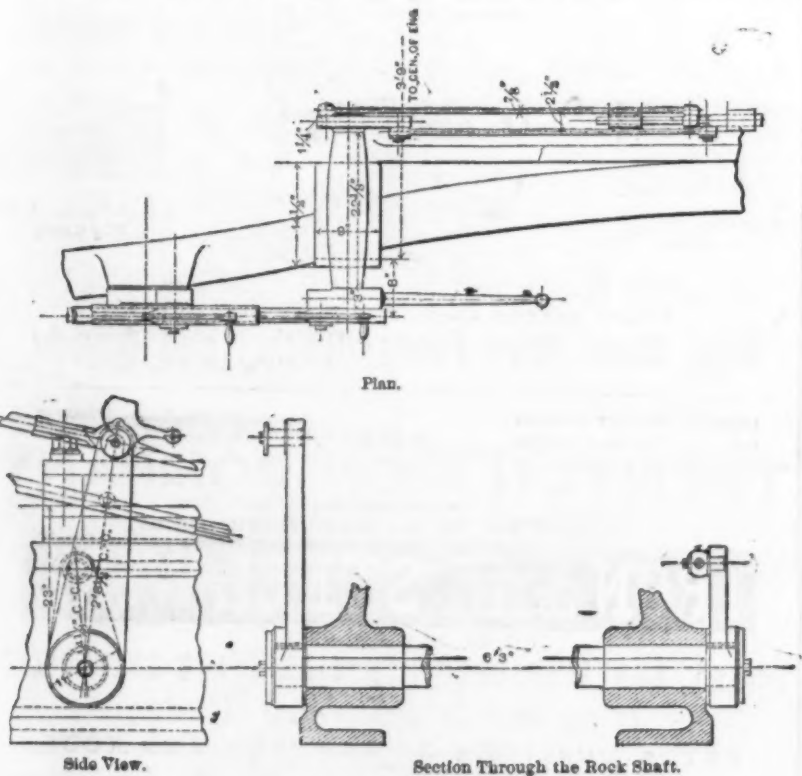


Fig. 2.—The Valve Gear.

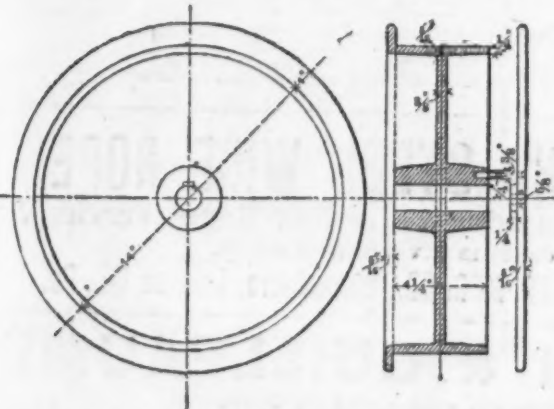


Fig. 3.—Governor Pulley.

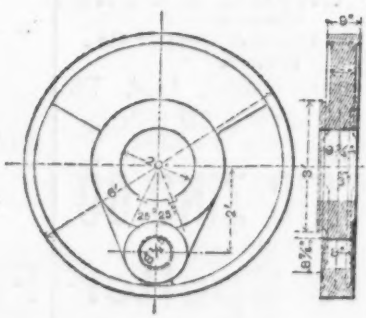


Fig. 4.—Side View and Section of Disk.

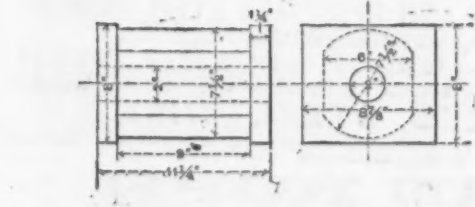


Fig. 7.—Cross-Head Pin.

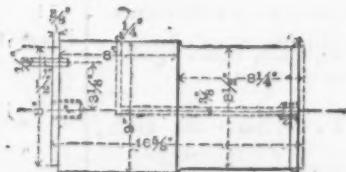


Fig. 8.—Crank Pin.

THE PORTER-ALLEN ENGINE.

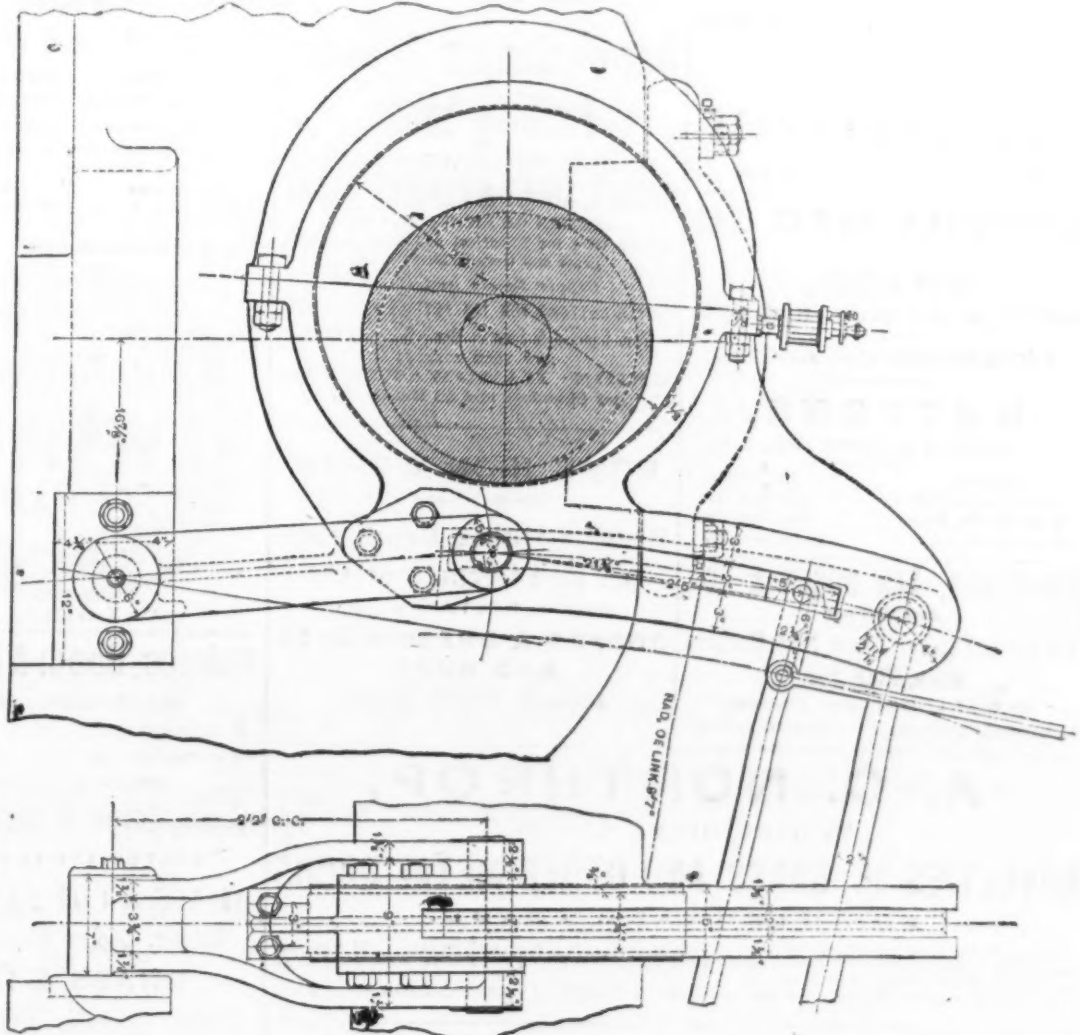


Fig. 5.—Link and Eccentric Strap and Suspensing Link.—Front and Side Views.

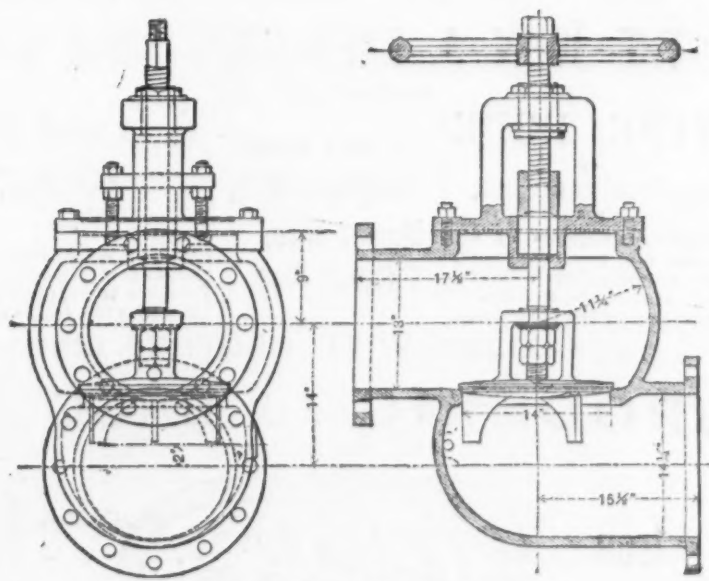


Fig. 6.—Elevation and Section of Stop Valve.

lamentable deficiency in blacksmithing, which art the English have been obliged to carry to a high degree of perfection, since they possess no convenient substitute for wrought iron. The Blacksmith and Wheelwright, in dwelling on this subject, states that the following example will clearly illustrate this:

The driving-wheels on American locomotives are cast, while the corresponding members upon English engines are made entirely of wrought iron. The finish imparted to the wrought work by machines and tools specially devised for the purpose conceals its actual character, and the casual observer, accustomed to American method, would never dream of the methods of manufacture. What we may call in familiar terms the hub is first fashioned under the steam hammer and by

the purpose are, of course, provided, and the workmen employed know just how to proceed. They therefore accomplish very readily what most American blacksmiths would fear to undertake. After the rim has been thus joined in position the surplus iron in the angles between the arms and the rim is carefully shaped and trimmed, imparting a grace and beauty to the wheel which would scarcely seem possible in such a heavy piece of wrought iron work. There is probably no other single piece of work used on both sides of the Atlantic in which there is so great a difference in the methods of manufacture.

Italians are now arriving from Europe in unprecedented numbers, and are prepared to compete with the Chinese in offering

given in Fig. 1, is 13 feet 3 1/4 inches long and 20 inches in diameter at the journals. The pillow-blocks are each 30 inches wide in the bearings, giving an enormous bearing. The material for the shaft is wrought iron, or air-furnace cast iron, which is preferred by some of the best managers. The eccentric is a part of the shaft, a feature that presents many advantages, not the least of which is the impossibility of altering its position in relation to the crank-pin, which this system of valve gear does not permit. The fly-wheel seat is 22 inches in diameter and has three keyways 60° apart, each outside arm being 30° from the center line, passing through the crank-pin. These keyways are 24 inches long, but do not pass the whole length of the seat, which is 25

weight for the balancing. The rim is 9 inches face and the web of the disk 3 inches thick.

The crank-pin, Fig. 8, is a little more than 16 inches over all. The pin is forced into place and riveted over, as shown in the drawing. A quarter of an inch is allowed for the purpose. The material is soft cast steel. The bearing surface is 9 inches in diameter by 8 inches in length. The diameters of all crank-pins in these engines are made somewhat greater than the lengths. The cross-head pin measures in section 7 1/2 by 6 inches and is 9 inches long, being flattened upon the upper and lower sides. At the ends are square flanges which fit into slots in the cross-head, thus making the pin secure in position. These pins are made of steel and ground be-

a key. The bearing surfaces are so large and so perfectly finished that the wear upon them is very slight, and no means of adjustment is considered necessary. The guides and cross-head, like the valves and valve seats, are scraped true and the work is tested by perfect surface plates. All joints, like steam-chest covers, cylinder heads and flanges, journal-box seats, are scraped fits, and the steam joints are all made tight, metal to metal, without washers or packing of any kind.

The governor is shown on a large scale in Fig. 13, which gives both an elevation and section. The balls are small and pivoted from a common center. The speed of rotation is very high, and consequently the centrifugal force is large. The weight of the



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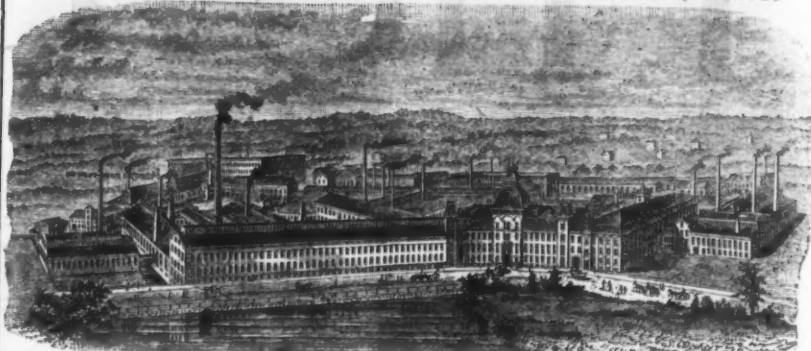
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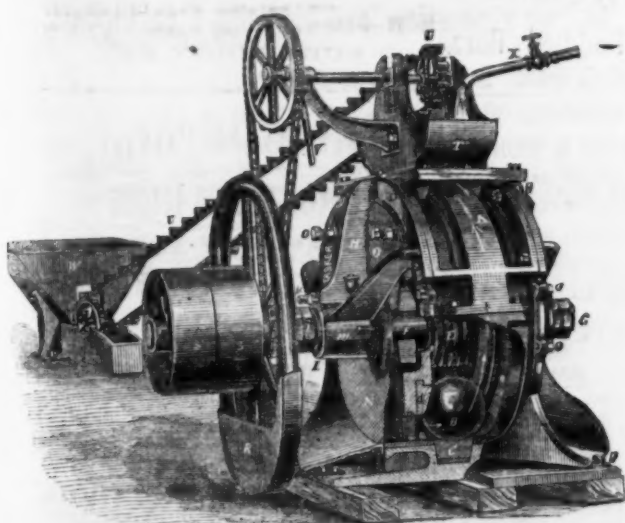
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balls, however, is not depended upon to bring them back, but a heavy revolving weight is placed upon the standard between

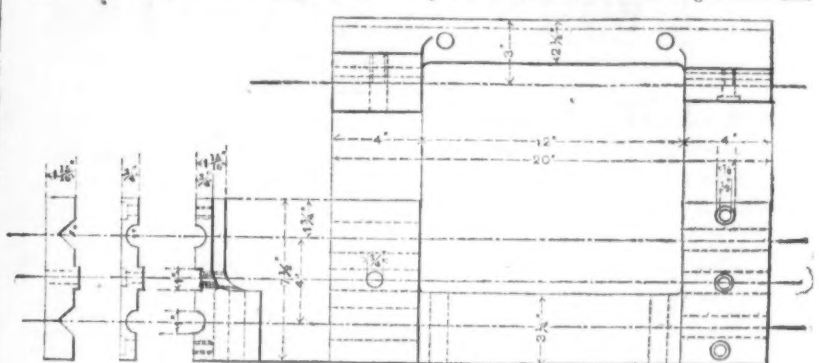


Fig. 10.—Guide for Valve Stems.

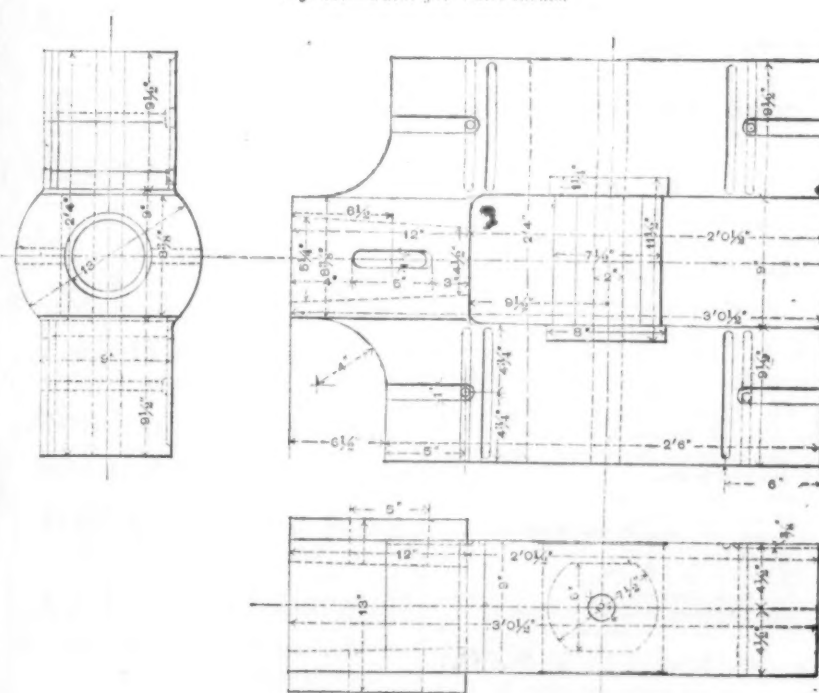


Fig. 11.—The Cross Head.—Plan, End and Top View.

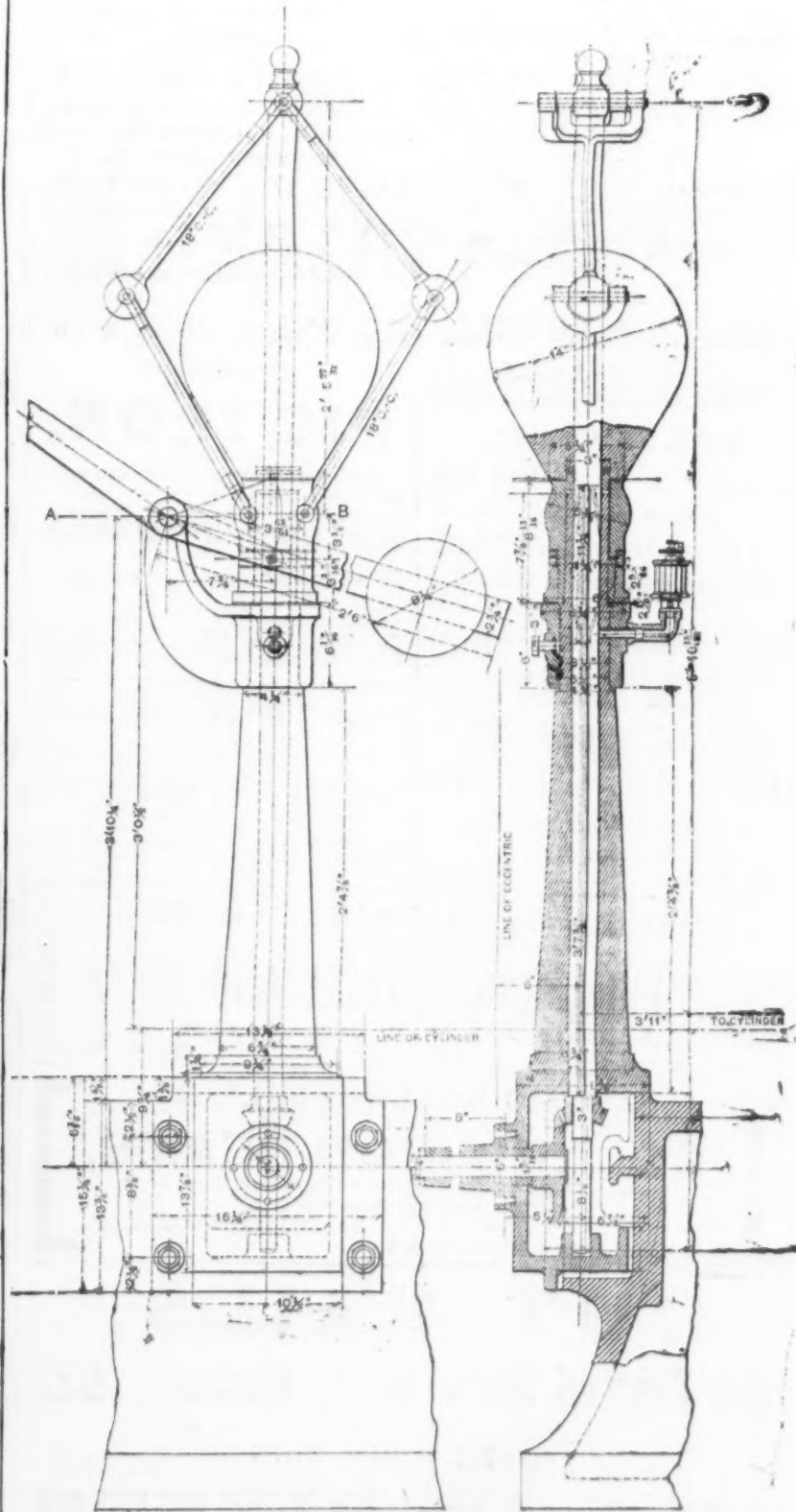


Fig. 13.—Elevation and Section of Governor.

them, and to this they are pivoted. An arm, which takes hold of the valve rod, is carried back to the governor weight and beyond, and upon this a counterpoise is placed. This

falls between extreme positions about 6 inches, while the horizontal movement of the balls outward is only 3 or 4 inches. The device for keeping up the positive lubrication of



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all parts of an engine when running at a  
very high rate of speed are peculiar.  
Though it is apparently a simple matter to  
keep all the parts of a high-speed engine  
perfectly lubricated, those who have under-  
taken the task will acknowledge that it is no  
easy one. The principle adopted was to fur-  
nish to every moving part the proper quan-  
tity of oil at each stroke. Thus the cross-  
head is provided with a wiper which at every  
forward stroke rises up and takes a drop of  
oil from a wick in the oil-cup provided for  
the purpose. This oil then flows through  
proper channels into the bearings. The sup-  
ply is, of course, constant and regular. In  
the same manner, on the crank-pin, oil is  
distributed with equal regularity to the pin.  
Upon the back of the pin a wiper is placed

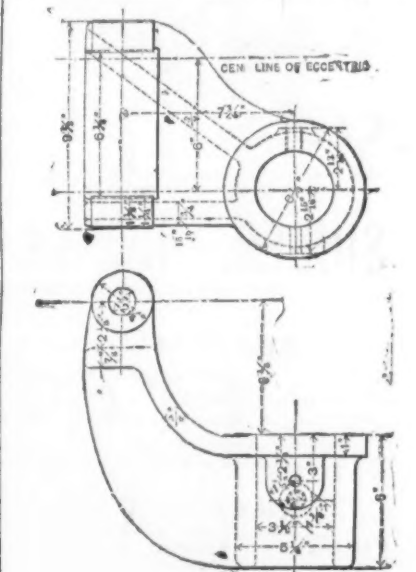


Fig. 9.—Governor Lever and Bracket.

which takes a drop of oil from an elevated  
oil-cup each time it passes its upper position.  
The centrifugal force then carries it outward  
and it passes into the body of the crank-pin  
and so outward to the bearing. Fig. 8 shows  
the position of the oil-hole in the pin. In the  
larger engines the main bearings are fur-  
nished with grease cups instead of the ordi-  
nary lubricators. The centrifugal force is  
made to distribute the oil to the bearings of  
the governor itself. In Fig. 13 the section  
shows how this is done. The oil-cup feeds  
the oil upon the spindle, in which there are  
a number of grooves so placed that they  
throw the oil upward upon the bearing sur-  
faces. It is also carried downward to the  
gearing in the base. The case is arranged  
in such a way that the drip is caught and  
not allowed to run down upon the bed-plate.  
Complete and continuous lubrication at a  
point as important as this is of the greatest

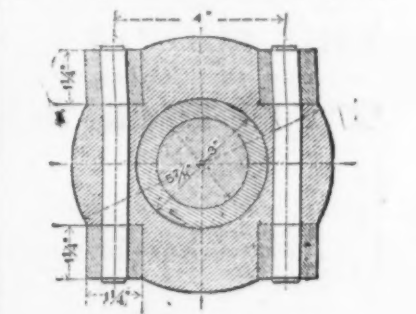


Fig. 12.—Section on Line A. B.

value, and upon it to no small degree depends  
the successful working of the engine. The  
boxes are all well scored to carry the oil over  
all parts of the bearings.

The views of the link and eccentric in  
Fig. 5, as well as the plans and top views of  
the bed and valve motion, show some inter-  
esting features in regard to the working out  
of the details. We have not room within  
the limits of a newspaper article to speak at  
length of all the interesting details of these  
engines, but the drawings give a sufficiently  
clear idea of most of them to those who can  
devote a little time to studying them.

**The Davis Island Dam.**—Congress has  
made an advance appropriation of \$100,000  
to continue work on the Davis Island dam  
on the Ohio, near Pittsburgh. This will be used  
to purchase materials for the weirs and a  
small portion of the dam yet to be built. Thus  
far the work has cost the Government about  
\$700,000. The first stroke of work in clear-  
ing off the north bank of the river for a loca-  
tion of the machinery was done on August  
17, 1878, and the winters of 1879 and 1880  
saw the coffer-dam of the land wall of the  
big lock in place. The summer of 1879 fin-  
ished the land wall; the coffer-dam for the  
upper 300 feet of the outer wall was finished  
and the concrete laid. In 1880 the founda-  
tion was completed and nine-tenths of the  
masonry was finished. Last year the wall  
was finished, a coffer-dam was built which  
left a huge area of dry land in the bottom of  
the river; the excavation was rapidly fin-  
ished, and, favored by exceedingly low water  
and fine weather, the engineers had every  
one of the 153 wickets for the navigable pass  
in position, leaving the whole ready to be  
completed in an easy fourth year's work.  
What remains to be done will cost, on a fair  
estimate, not over \$200,000 after the mat-  
erials have been purchased.

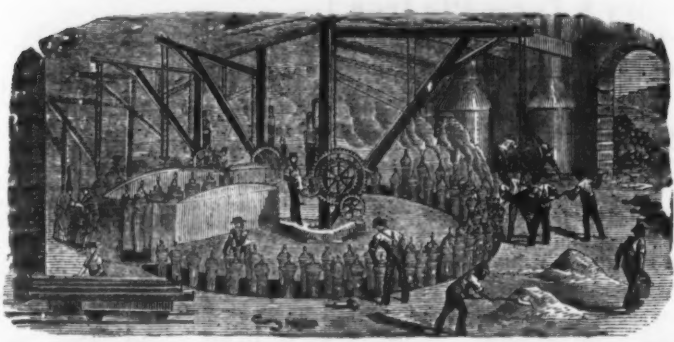
**Duration of Steel Rails.**—The Com-  
mission appointed by the General Council of  
Ponts-et-Chaussées has lately been engaged  
in studying the respective merits and qualities  
of the different sorts of rails adopted by the  
French railway companies. From numerous  
experiments made in connection with this  
subject M. Gruner, the well known met-  
allurgist, draws the following conclusions:  
(1) That mild steel rails wear less and con-  
sequently last longer than the hard steel  
rails generally used in France; (2) that this  
more rapid wear of the hard steel is due  
chiefly to the greater liability to oxidation



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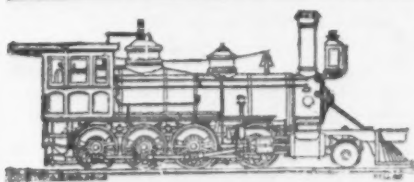
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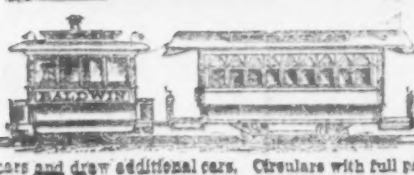
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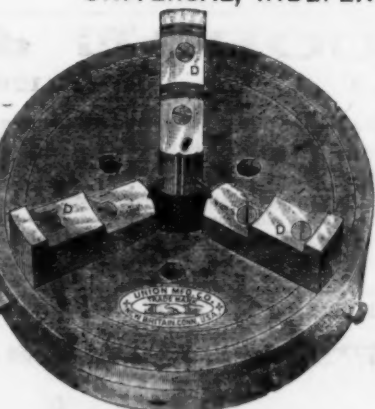



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displayed by iron and steel when allied with manganese, silicon or phosphorus; (3) double-flanged rails may, without inconvenience, be made of harder steel than single flanged rails; (4) that railway companies should agree among themselves to adopt a certain number of patterns in common, and that, if they still have any doubts as to the truth of the above conclusions, they should appoint a committee of engineers and chemists to study carefully the various causes that influence the duration of rails, inviting for this purpose the co-operation and assistance of the chief manufacturers.

**Notes on Siemens' Furnace Patent.**

The following correspondence has been sent us for publication:

PITTSBURGH, February 11, 1882.  
Messrs. — & Co.—DEAR SIR: I have, at your request, examined the following Letters Patent granted to the Messrs. Siemens, viz.:  
Patent to C. W. & F. Siemens, Reissue No. 3265, of patent No. 41,788, of March 1, 1864;  
Patent to C. W. & F. Siemens, No. 42,717, of May 10, 1864;  
Patent to C. W. & F. Siemens, No. 89,441, of April 27, 1869;  
Patent to C. W. & F. Siemens, No. 93,578, of August 17, 1869, Process;  
Patent to C. W. & F. Siemens, No. 95,843, of October 12, 1869;  
Patent to C. W. & F. Siemens, No. 113,584, of April 11, 1871;  
Patent to C. W. & F. Siemens, No. 189,273, of April 3, 1877;  
Patent to C. W. & F. Siemens, No. 190,015, of May 15, 1877,  
with a view to ascertaining whether anything claimed therein will prevent your constructing a regenerative steel furnace described to me by Mr. Ryder. I had hoped to receive a plan of the proposed furnace before giving you a written opinion, but not having done so, I must trust to my understanding of the verbal description I received, since you desired me to communicate my views before the beginning of next week. The patents in question all refer to what is known as the Siemens Regenerative Furnace.

The first named patent, Reissue No. 3265, will expire, on any construction of the law, on 1st of March next, and as this date is so near, it is hardly worth while to consider the question whether it has not already expired in view of previous British patents, viz.: No. 2861, of 1856, to Frederic Siemens; No. 1320, of 1857, to C. W. Siemens; and especially No. 167, of 1861, to C. W. & F. Siemens. The first of these British patents covers the principle of the regenerative furnace, both as applied to a furnace using solid fuel, and to a furnace in which gaseous fuel only is used; the second describes the application of the regenerators to a puddling furnace, and the third describes its application to furnaces for iron, glass, pottery, &c., with a gas producer. If, as we may suppose, Frederic Siemens alone was the inventor of the apparatus described in his British patent, No. 2861, of 1856, it is a matter of great doubt whether the first and fourth claims of the United States patent Reissue No. 3265, are not invalid, as being a patent to two persons for what was the invention of one of them. It is, however, unnecessary to discuss this question, in view of the near approach of the expiration of that patent.

The next patent is No. 42,717, of May 10, 1864, to C. W. & F. Siemens, for gas producers. The invention claimed in this patent is fully described in British patent, No. 167, of 1861, to same parties. I am inclined to the opinion that this patent expired on 22d January, 1878, or 17 years after the date of the British patent referred to. This, however, depends upon the construction to the Patent Act of March 2d, 1861. In a recent decision of Judge Blatchford, in which he goes into an elaborate examination of the law, and criticism of the authorities, he holds that where a prior foreign patent has been granted to the United States patentee, under that act of Congress, the United States patent expires in 17 years from the date on which the foreign patent commenced to operate in favor of the patentee. This view, however, conflicts with what was previously supposed to be the law, by the profession, but, as I stated, is probably the better opinion. In any event this patent (which covers only the gas producers) will have expired on the 10th of May next.

Patents No. 89,441, of April 27, 1869, and 95,843, of October 12, 1869, may be examined together; the drawings are the same in both. In the former of these patents the claims are chiefly on the process of treating metal in the bath with oxide of lead, nitrate of soda, &c., and the use of hoppers in connection with a series of regenerators. The latter patent is for a process of making steel by reducing ore to sponge without contact with the air into a bath of melted pig metal. These two patents do not affect the present question, excepting that the drawings appear to represent a series of gas and air flues from the regenerators, located side by side, with the air flues opening into the furnace above the gas flues. But there is no description nor claims referring to this peculiarity of construction.

Patent No. 113,584, of April 11, 1871, is for a process and apparatus for the production of cast steel from ore. The only claim affecting the regenerative furnace is the 11th, which is as follows: "Constructing the air and gas ports of a steel-melting furnace in such a manner that the vertical air ports rise nearly to the roof of the furnace, while the side walls of the flues are extended forward in a convergent manner until they meet, in order that the air may issue into the furnace in diverse directions, above the combustible gas substantially as herein described with reference to Figs. 8 to 10 of accompanying drawings." The patentee states that the furnace is the same as described in British patent, No. 1894, of 1868, excepting that the air and gas are mixed differently, that the furnace bottom is differently prepared, and that the furnace has a charging chamber at the back. The claim above quoted is not broadly for introducing the air above the gas; but is for the combination of

air flues rising nearly to the roof and opening above the gas flues, and gas flues with flaring openings, so that the air may issue in diverse directions. As I understand the construction of the furnace which you propose to construct, you do not propose to embody this feature; so that as at present advised I do not think you would infringe this patent. I should, however, be glad to have a clearer idea of the exact construction which you propose to adopt.

Patents No. 189,273, of April 3, 1877, and No. 190,015, of May 15, 1877, were applied for on the same day, and the drawings are the same in both. I may therefore consider them together, the earlier patent being for a process, and the later one for the apparatus. The process claimed is in brief for converting iron into steel by tapping the melted cast iron from the refining furnace into a ladle lined with refractory material and containing solid ferromanganese. As I understand, you do not propose to use this process in your new furnace. The other patent is for improvement in regenerative furnaces, which have reference to the air and gas flues from the regenerator, and to a cave under the furnace. The patentee does not claim broadly a series of gas flues and air flues as distinguished from single air and gas flues or passages as shown in the Patent Reissue, No. 2861, of 1856, and it is doubtful, for several reasons, whether he could reissue this patent and make such a claim, although it is possible that one of the former patents, No. 89,441 before referred to, might be reissued. The claims which refer to the flues are the first and second. In the first claim the patented feature is a series of air flues arranged behind the gas flues, each air flue overlapping the gas flue in front thereof. I suppose this to mean each air flue overlapping on both sides, the gas flue which is in front of it; and from a careful reading of the specifications, I also suppose overlapping to mean not overhanging, but extending beyond it laterally on both sides. So interpreted, I do not think that a furnace with flues located and relatively proportioned as I understand you propose to build it, would infringe the first claim; especially as I understand you do not propose to construct your flues back to back, or so that they could possibly overlap. The second claim is for a series of air flues, so constructed and arranged relatively to the gas flues as to be behind the gas flues, to rise above them, and that the top of each air flue shall be wider than the gas flue in front of it. All these features must combine in order to constitute an infringement. I am not quite clear as to the construction you propose to adopt, so far as affected by this second claim of Patent No. 190,015, but, if I understand Mr. Ryder correctly, your air flues are not to be either behind the corresponding gas flues, or wider at top than they are. In this case you would not infringe. Respectfully,

W. BAKWELL.

WASHINGTON, D. C., March 30, 1882.  
Letters Patent No. 89,441 were granted C. W. Siemens, April 27, 1869. This patent was afterward reissued in three divisions, A, B and C. Our opinion is desired with reference to the validity of Reissue, Division B, No. 7863, granted to C. W. Siemens, August 28, 1877. The original patent contains an elaborate description of an improved process of making steel, and different constructions of furnaces for carrying the process into effect. In this patent the furnace which is considered to be the main or preferred form of construction, is provided with a vertical hopper having an inclosing air-heating chamber. Figs. 15, 16, 17, 18 and 19 of the drawings are said to represent a modification. The only point of difference specified in the patent is that, in the modification, sloping hoppers are substituted for the vertical hoppers. The original patent contains seven claims, the first and second of which are process claims. The third claim covers the tubular hoppers, the surrounding heating chambers and the furnace, combined and arranged to operate substantially as shown. The fourth claim covers gas supply tubes arranged within the hoppers. The fifth claim covers construction and arrangement of pipes for supplying gas to the hoppers. The sixth claim covers the combination of the system of heat generators, the furnace, tubular hoppers and the air-heating chambers surrounding the hoppers. The seventh claim covers the combination of the hoppers, the heating chambers, regenerators constructed and arranged to operate as described.

Turning now to Reissue 7863, it is found that it embraces seven claims, not one of the number being for anything to which the patentee had asserted any right or claim to in the original patent. The first claim covers a regenerative gas furnace in which the air regenerator is as much larger than the gas regenerator as the volume of air required to insure complete combustion is larger than the volume of gas. While the original drawings apparently show the air regenerator as being larger than the gas regenerator, yet the original patent contains no hint or suggestion that any particular ratio exists between these parts, or that any improved result is attained by making them of different size, or that the patentee considered that such feature constituted any part of his invention or improvement. No claim to such feature of construction is made in the original patent, and as has been stated, there is nothing in the original to indicate that it was of any importance, or that it constituted any portion of the invention. The second claim covers the arrangements of parts for introducing the air to the furnace at a higher level than the gas inlet. This feature of construction is not even referred to in the original patent, and the only foundation for the claim is the model and drawing. The original patent contains no suggestion that any advantage results from the arrangements of the air and gas inlets as specified in the claims; neither does it even mention the fact, that the air and gas inlets are arranged in the manner specified. The third and fifth claims relate to a certain construction and arrangement of partition walls between the air and gas flues. This feature of construction was not referred to, or suggested in any manner in the original patent. There is no hint or assertion in the original patent that any



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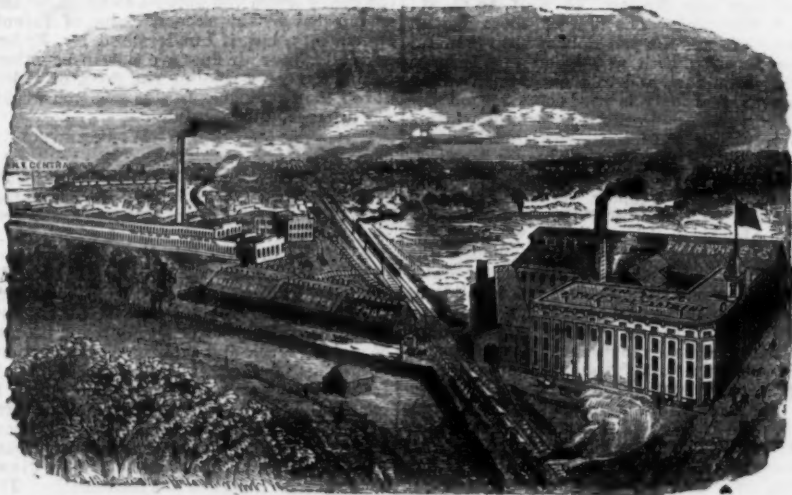
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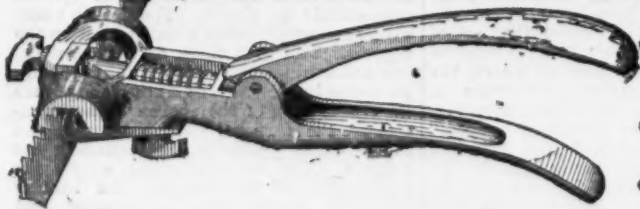
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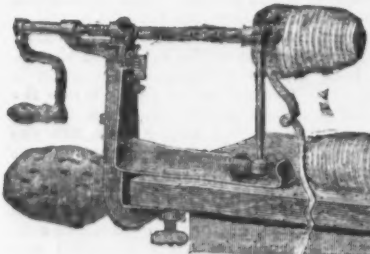
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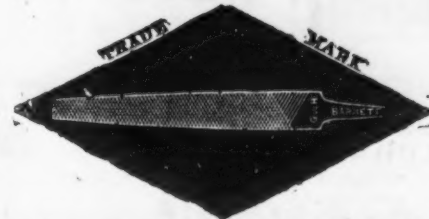
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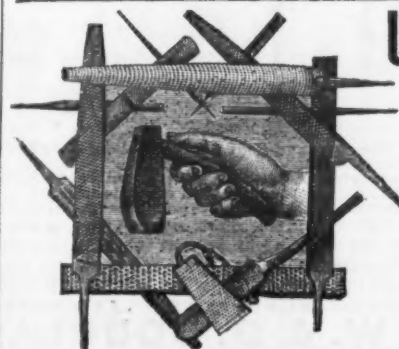
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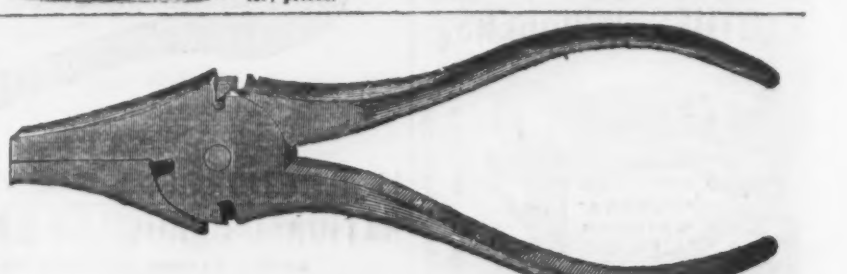
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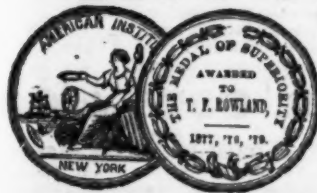
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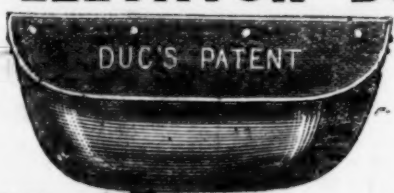
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advantages result from such a construction and arrangement of parts, or that the patentee considered that such feature constituted any portion of his invention. The fourth claim relates to the relative location of the gas and air flues and the gas regenerators, the claim covering said flues when located above the gas regenerator. In the original patent there is no hint or suggestion that any particular advantages occur from this arrangement of parts, or that such an arrangement of parts constituted the invention of the patentee. The sixth claim relates to the arrangement of the tie rods beneath the furnace bottom. This construction of parts is not even referred to in the original patent, and no statement is therein made that any such feature of construction is the invention of the patentee. The seventh claim relates to the combination of a ladle mounted on wheels with the regenerative gas furnace.

From the foregoing it will be observed that the reissue patent in question is based on matter illustrated in the drawings of the original patent, but not described or claimed therein. Hence the reissue was not obtained for the purpose of correcting the claims of the original patent, and not even described therein. This state of facts leads us to an examination of recent decisions of the Supreme and Circuit Courts relating to reissue patents. In *Swain Turbine and Manufacturing Co. vs. Ladd*, 19, O. G., 62, suit was brought on a reissue patent granted twelve and one-half years subsequent to the date of the original patent. The original patent contained three claims, while the reissue embraced eleven different and broad and sweeping claims. The Supreme Court considered the reissue in view of the limitations imposed on the claims of the original, and held that the broad claims embodied in the reissue were void. The practice of granting broad and expanded claims in a reissue was severely criticised by the Court, as will be observed from the following language to be found in his decision: "It was never intended to allow a patent to be enlarged, but to allow the correction of mistakes inadvertently committed, and the restriction of claims which had been improperly made or which had been made too broad—just the contrary of that which has come to be the practice. In a clear case of mistake (not error in judgment) the patent may undoubtedly be enlarged, but that should be the exception, and not the rule, and their contraction the rule. \* \* \* The invention of a wheel was not claimed at all. A wheel was described, but it was a wheel made after a particular pattern or form, and adjusted to a particular apparatus for the reception and discharge of the water. \* \* \* Instead of correcting inadvertent mistakes in the specification which rendered the patent inoperative and void, the pretended descriptions are evidently intended to widen the scope of the patent and make it embrace more than it did at first. The mistake of the patentee, or his assignee, seems to have been in supposing that he was entitled to have inserted in a reissued patent all that he might have applied for and had inserted in the original patent. \* \* \* A reissue can only be granted for the same invention which was originally patented. If it were otherwise, a door would be opened to the admission of the greatest frauds. Claims and pretensions shown to be unfounded at the time, might after the lapse of a few years, a change of the officers of the Patent Office, the death of witnesses, and the dispersion of documents, be set up anew, and a reversal of the first decision be obtained without appeal and without any knowledge of the previous investigations upon the subject. \* \* \* Hence there is no safe or just rule but that which confines a reissued patent to the same invention which was described or indicated in the original."

See also the *Powder Company vs. The Powder Works*, (98, U. S., 126). In the case of *Kells vs. McKenzie*, 20, O. G., 1663. Suit was brought on a reissued patent for an improvement in brick machines. The Court, after discussing the recent decision of the Supreme Court on reissue, and particularly the decisions hereinbefore referred to, state as follows: "Bearing in mind now that the reissue must be for the same invention as the original patent, and that the fact that the patentee might have applied for and had inserted in his original patent all that he now claims is not conclusive evidence that his reissue is valid, let us examine the reissue in the light of these authorities. Is it for the same invention as the original? In the original patent, No. 124,590, the patentee specifies his invention in the following precise and unequivocal language. \* \* \* It will then be seen that this statement of his invention, as well as the eight claims made in the original patent, relate solely to that portion of the machine in front of the forward standard, at the point where the clay passes beyond the action of the screw, and is molded to pass through the dies. There is no intimation that he claims any novelty in the general construction of the machine, or of its tub or standards, or of any combination by which the tub is attached to the standards, or the standards are held in place and prevented from spreading, although it is true that the drawings annexed to his patent show a machine completed in all these particulars. This patent was issued March 12, 1872. The defendants began building machines similar in general construction to complainant's machine, but avoiding the use of that portion of the machine covered by complainant's patent, in the fall of 1877. In July, 1879, complainant applied for a reissue in which he states his invention as before, but enlarges very greatly its scope. \* \* \* Four additional claims are made, none of which have any relation to the claims in the original patent. Now if it be true that the patentee may claim in his reissue anything which was suggested in the drawing of his original patent, this reissue is valid; but if he is confined to what he declares is his invention in his original patent, then it is invalid. There is nothing here tending to show that his original patent was inoperative or invalid, by reason of a defective or insufficient specification, but the contrary, his specifications

are full and complete, and his claims appear to cover everything which he set forth as his own invention. There is no attempt to amend the claims contained in the first patent. There is not even an attempt to enlarge the scope of these claims; but there are four new and distinct claims made to parts of the machine, to which no reference is made in the original patent as his invention. Indeed, a comparison of the two specifications precludes the idea of inadvertence, accident or mistake, since all but two of the claims of the original patent are reproduced in the reissue, and there is no pretense that this patent was inoperative or invalid as to anything therein claimed to be the patentee's invention. It appears to be a case where the patentee has materially enlarged the scope of his patent for the purpose of reaching those who are constructing machines after the same general design as his own. Upon the best consideration I have been able to give this matter, I have come to the conclusion that this reissue cannot be supported, and that as to those four claims it is void."

In the case of *James vs. Campbell, et al.*, 21, O. G., 337, the Supreme Court states as follows: "When a patent fully and clearly, without ambiguity or obscurity, describes and claims a specific invention, complete in itself, so that it cannot be said to be inoperative or invalid by reason of a defective or insufficient specification, a reissue cannot be had for the purpose of expanding and generalizing the claim so as to make it embrace an invention not described and specified in the original."

Turning now to the case in hand. In the first place, we are of the opinion that the records establish, beyond a reasonable doubt, that it was not through any accident, inadvertence or mistake that Siemens failed to embrace the claims of reissue, B No. 7863, in his original patent. Referring to the records it is found that Siemens' claims, as presented in his application on which his original patent was granted, were worded as follows:

First.—The above-described process of making cast steel upon the open hearth of a furnace, such process being by effecting simultaneously the reduction of iron ores, in one or more heated hoppers and the solution of the reduced metal (without exposing it to the flame) in a bath of metal provided in the furnace, substantially as hereinbefore described.

Second.—The mode of making cast steel upon the open hearth of a furnace, the same consisting in causing wrought iron, steel, or white cast iron to descend upon inclined planes, or through hoppers (where the metal becomes gradually heated) and into a fluid bath of cast iron, under the influence of very intense heat, the metal being dissolved in such bath and converted into cast steel, substantially as set forth.

Third.—I also claim the employment of a regenerating gas furnace with a bath of metal and one or more hoppers used and described during and by the process of making steel thereby, as explained.

The records show that he had other applications then pending, and that the application in question was held to disclose certain improvements in the process of making steel, and certain features of construction relating to the hoppers, and these were improvements on his prior patents. Objections having been raised to the claims they were erased, and the claims as granted in the original patent were allowed. It is clear to our minds that this original patent was prosecuted with care and deliberation, and that Siemens obtained protection for that which he considered as an improvement and invention. As regards the improvements covered by the claims, the specification and the drawings were full and complete. There is nothing to show that the patent was inoperative or defective in the sense that would warrant the grant of a reissue as a corrective measure. But there are conclusive reasons for holding that the original patent was not inoperative or defective to the extent of affording protection for the improvements shown, described and claimed therein. In reissue, Division A, No. 7562, the claims of the original patent are reproduced so as to cover the identical features of invention shown, described and claimed in the original patent. Hence Siemens, by obtaining his reissue, secured everything that was granted to him originally, but also obtained two annexes, or so-called reissue divisions, and it is with reference to Annex B that we have to deal with. The claims of this reissue do not relate to the subject matter claimed in the original. The reissue was not granted for the purpose of correcting the original claim, but was granted to cover features of construction nowhere suggested in the original patent as embodying the invention of the patentee. The original patent did not even describe the construction or function of the features of improvement covered by the claims of this reissue. The only basis for these claims is the drawings of the original patents. But these drawings were made a part of the original patent to disclose a modified construction of hopper, which feature the inventor claimed as his invention. We are of the opinion that, under the rulings of the courts referred to, this reissue patent could not be sustained, on the ground that it covers a different invention from that covered by the original patent, and that there is nothing in the law to warrant the grant of a reissue of this character.

There is still another reason for holding that Reissue 7863 is invalid. The original patent was granted April 27, 1869, and the reissue was granted August 28, 1877. It will thus be observed that the patentee delayed more than eight years before surrendering his original patent and obtaining the reissue. Now, under recent decisions, the question of delay in applying for a reissue is vital to the validity of the patent. In *Miller & Co. vs. the Bridgeport Brass Co.*, the Supreme Court stated as follows: "The only mistake suggested is that the claim was not as broad as it might have been. This mistake, if it was a mistake, was apparent upon the first inspection of the patent, and if any corrections were desired, they should have been applied for immediately. \* \* \* The pretense in this case, that there was an inadvertence and oversight which had escaped the notice of the patentee for 15 years, is too bald for human credence. He simply



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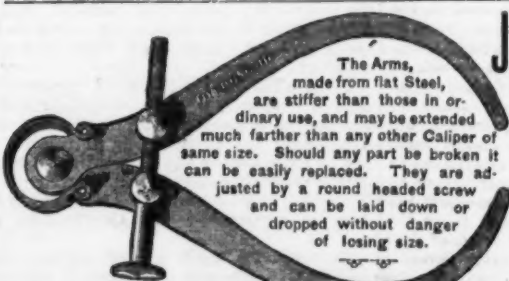
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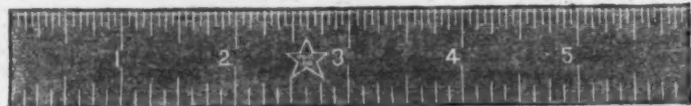
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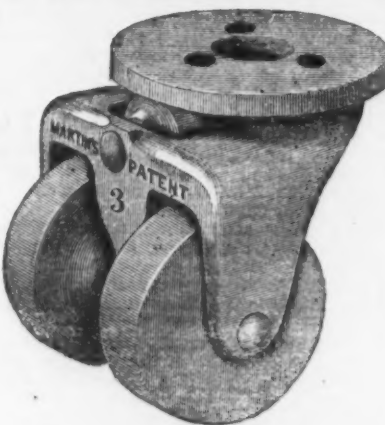


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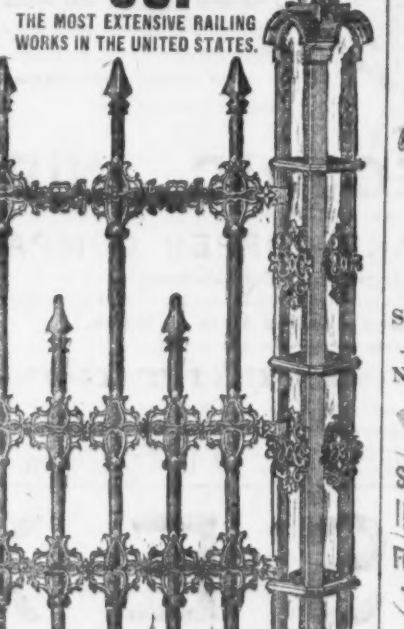


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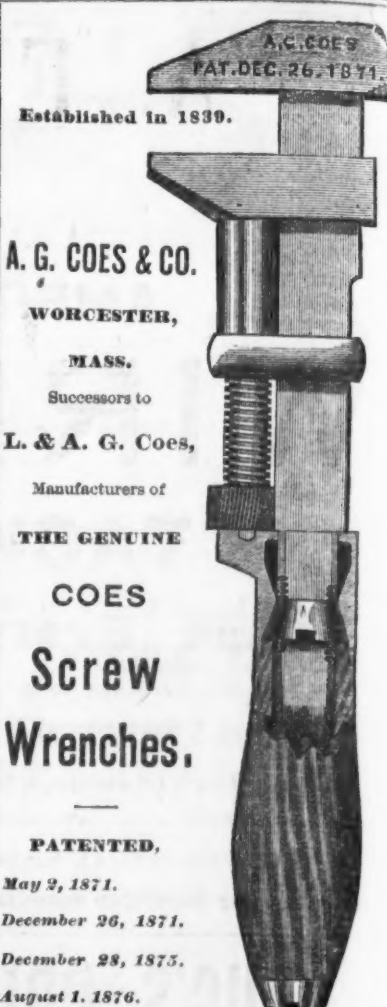
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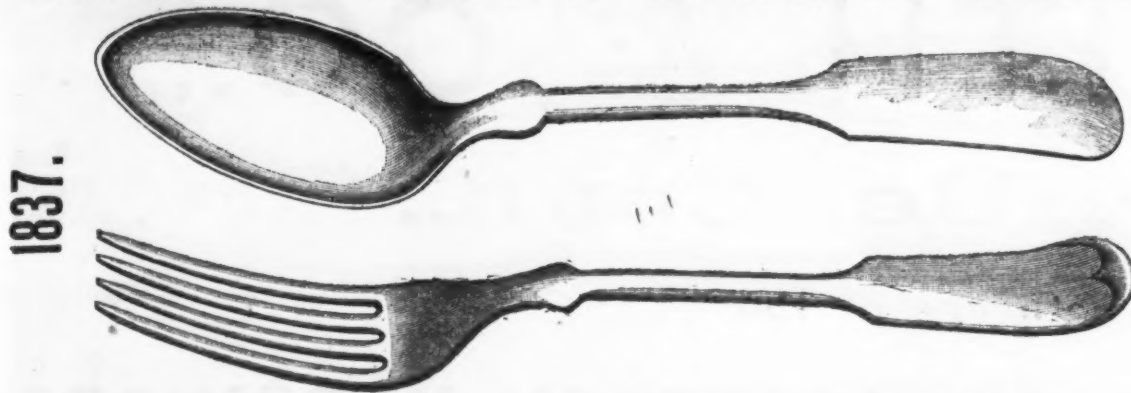
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(See Iron Age first issue of each month.)

appealed from the judgment of the office in 1860 to its judgment in 1876; from the Commissioner and Examiner of that date to the Commissioner and Examiner of this, and upon a matter that was obvious on the first inspection of the patent. If a patentee who has no corrections to suggest in his specification, except to make his claims broader and more comprehensive, uses due diligence in returning to the Patent Office, and says, 'I omitted this,' or 'my solicitor did not understand that,' his application may be entertained, and, on a proper showing, corrections may be made; but it must be remembered that the claim of a specific device or combination and an omission to claim other devices or combinations apparent on the face of the patent are in law a dedication to the public of that which is not claimed. It is a declaration that that which is not claimed is either not the patentee's invention, or if his, he dedicates it to the public. This legal effect of the patent cannot be revoked unless the patentee surrenders it and proves that the specification was framed by real inadvertence, accident or mistake, without any fraudulent or deceptive intention on his part, and this should be done with all due diligence and speed. Any unnecessary laches or delay in a matter thus apparent on the record affects the right to alter or reissue the patent for such cause. If two years' enjoyment of an invention with the consent of and allowance of the inventor is evidence of abandonment and a bar to an application for a patent, a public disclaimer in the patent itself should be construed equally favorable to the public. Nothing but a clear mistake or inadvertence and a speedy application for its correction is admissible when it is sought merely to enlarge the claim. \* \* \* In such a case, even he who has rights and sleeps upon them justly loses them."

See also, James vs. Campbell (21, O. G. 27). On the strength of the decisions by the Supreme Court, referred to, Judges Butler and McKenna, of the Eastern District of Pennsylvania, rendered a similar decision in the case of Combined Patents Can Company vs. Lloyd, (21, O. G. 713). In this case the original patent was granted in 1864, and reissue obtained in 1877. The recent decisions relative to reissues are discussed at length. The Court states as follows: "We are thus brought to the inquiry before suggested. Was the patentee estopped by delay and acquiescence from claiming correction of his patent by means of the reissue obtained? Nearly thirteen years elapsed before his application was made. If the matter described in the additional claims were a part of the original invention (as has been conceded) and were omitted through 'inadvertence, accident or mistake,' it is impossible to believe that he did not discover the omission much earlier. In the language of the Court in Miller & Co. vs. The Brass Company, it plainly appeared on the face of his patent and must have been seen on opening the paper. The patentee knew what he had invented, must necessarily have understood its scope and extent. He may not have comprehended all of the uses to which it might eventually be applied. But to secure a different use simply does not require a different or additional claim. What he did not claim, he must be regarded in view of his subsequent conduct as intending to dedicate to the public. \* \* \* The bill must for the foregoing reason be dismissed with costs, &c."

Taking these decisions as a guide, we are of the opinion that the courts would hold the reissue invalid on the question of unreasonable delay alone. It is clear to us that in his original patent Siemens secured all that he had hoped to secure, and in fact everything that he asked for. When his case was originally presented he asked for three claims two relating to an improvement in the process of making steel and one to the construction of the hopper. The application was amended by his attorney who claimed the process claim, and also several other claims relating to the hopper and its attachments. There was no attempt made in the prosecution of the original application to secure claims on the features of construction covered by the claims of reissue 7863. The construction and function of such parts was not even explained in the specification. All this goes to show that Siemens did not consider such features as constituting any portion of his invention. If the contrary had been the fact, it must have been clear to him in opening the patent that he had not only failed in obtaining claims to the features now covered by the claims of the reissue in question, but had also failed to lay any foundation for such claims in his specification. But Siemens it seems was satisfied with his original patent. He allowed eight years to pass without a word of complaint, and at the expiration of this period of time concludes to apply for a reissue. But his application was not for the purpose of correcting or strengthening his claim, as he secures in one reissue division substantially a duplicate of his original patent. The reissue application was made for the purpose of securing claims to features of construction not described, or claimed or suggested as forming any part of his original invention. We are of the opinion that the courts would hold that the reissue is invalid for the reasons stated viz., that it is for a separate and distinct invention from that for which the original patent was granted; and, second, that the patentee did not exercise due diligence in making his reissue application. Respectfully submitted,  
LEGGETT & LEGGETT.

It is reported that the National Mineral and Metallurgical Exhibition, which was to have been opened at Madrid in May next, has been put off till April, 1883. Spanish diplomatic representatives abroad will be charged to invite exhibits of mining products and metallurgy, articles intended for exhibition being received up to February 15, 1883.

It has been noticed that copper, when melted with salt, and subsequently cooled, is much tougher than ordinary copper, this being due, in all probability, to the removal of the cuprous oxide which is generally present in greater or less quantities. It has also been observed that the addition of salt to molten copper has the same effect as polishing, and it seems that the determination of the

loss of weight after such treatment is an easy and rapid method for the estimation of cuprous oxide present.

## LABOR AND WAGES.

A letter from St. Louis says: The blast furnaces connected with the Vulcan Steel Works are out on a strike for wages, amounting to a raise of 25 cents per man for keeping, top and bottom filling, helping and iron carrying. Joliet pays keeper, \$3; helpers, \$2.35; top fillers, \$2.35; bottom fillers, \$2.25; iron carriers, \$3. Vulcan pays keeper, \$2.50; top fillers, \$2.10; bottom fillers, \$1.75; iron carriers, \$2.25; helpers, \$1.90.

There is a strike threatened at the Pittsburgh Hinge Works against a reduction of 20 per cent. on general work and 30 per cent. on stock.

About 200 men in the blast furnaces of the Bethlehem Rolling Mill struck on the 19th, upon notification that their demand for an increase of wages would not be conceded. The strike lasted until the 22d, when most of the strikers resumed work.

The Mineral Ridge district miners, Cleveland, who have been working at 10 cents reduction, came out of the mines on the 18th and will await the action of the State Committee at Columbus. The Churchill miners gave notice that 10 cents advance would be asked after next Monday.

A number of secret emissaries from the Pittsburgh iron districts are quietly operating in the Lehigh and Schuylkill valleys with a view of inducing men in furnaces and rolling mills to go on strike. At Clarke, Reeves & Co.'s Phoenix Iron Works, where one strike recently occurred, but was adjusted, it is said several Reading officials of the Amalgamated Association are endeavoring to induce the leading workers to strike and close the mills. If there is any truth in the above report, which was widely telegraphed over the country from Philadelphia, it is probable that the Amalgamated Association are doing just what they have been doing for the last 10 years, trying to get the Amalgamated Association established East.

Trouble is brewing among the ironworkers at Johnstown, and a great strike is feared. Associated Press. There may be something in this report. The Bessemer steel works have not had many labor troubles, but they have been increasing. The extreme Western mills were the first to suffer. Then Homestead but recently, and it is understood that the Amalgamated Association has secured a footing at the Edgar Thomson.

The strike in the Cumberland (Md.) region still continues, and both parties seem determined as ever. The miners in this region have the reputation of being a superior class of men. If this is so, and both sides are willing to do what is just, there should be no trouble in coming to an agreement.

On Monday work was resumed at the bar mill in the Clinton Iron Works, Pittsburgh. Work has been suspended in this department for the past four weeks, owing to a strike of the straighteners, hook-ups and drop-downs. The men were paid \$1.65 and \$1.75 per day, but they wanted to be paid 16 cents a ton, which would enable them to earn about \$2 per day. All of the old employees have been discharged and new men have been employed at the old wages.

The miners' convention, at Columbus, Ohio, passed a resolution that "the miners of Ohio reduced since February 1, 1882, demand the restoration of former prices, and if refused, to mine no more coal until conceded. This resolution to take effect Monday, April 30."

The following wages are given as those paid at Bethlehem, Pa: Keepers, \$1.80; helpers, \$1.59; casters, \$1.54; fillers, \$1.50; cin dermen, \$1.48; stock breakers, \$1.26.

## NEW PUBLICATIONS.

We have recently received a very useful little collection of rules and tables, published by the *Memento de l'ingénieur et du Constructeur*. The book, which comprises some 137 pages, contains a small table of logarithms, of sines, tangents, cosines and cotangents, besides useful information for the spacing of boiler rivets, &c. It is about 3 inches in length and 2 inches in width.

## Structural Steels.—IV.

BY ALBERT F. HILL, C. E.

Another important consideration in welding steel is the heat. While it is impossible to give any specific rules on this point, the general rule, which will be found to hold good in all cases, is not to heat the steel any higher than is absolutely necessary to effect a weld—the higher the steel is in carbon, the lower the heat at which it ought to be worked—and next, not to finish the operation at too low a temperature. It will, therefore, be best to work the steel as rapidly as possible, reheat as often as is required to prevent working or finishing cold, and anneal immediately after welding the whole piece—not only the immediate vicinity—containing a weld, at a heat higher than that at the finishing.

In the manufacture of eye-bars the hydraulic upsetting process will, without doubt, be found to give the best results, yet the writer has no hesitation in saying that the eyes may be formed by welding; if done by experienced hands who really understand the heating and treatment of steel, without any greater risk of imperfect welds than there is in iron. The danger from welding is no greater in steel than in iron, and the source the same in both—namely, bad workmanship.

As regards the enlarging of the ends of round bars for cutting screw-threads by upsetting, it is not to be recommended. The better practice will be found to be to cut the threads directly on the rolled bar, and compensate for the loss in strength by increased diameter of the whole bar, rather than to resort to upsetting. While this is not practicable in iron, it is in steel, as the far greater strength of the material admits of it with but trifling increase of diameter.

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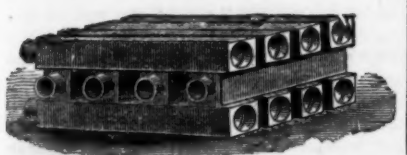
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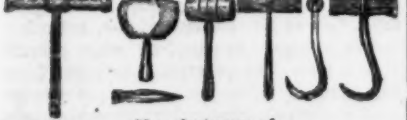
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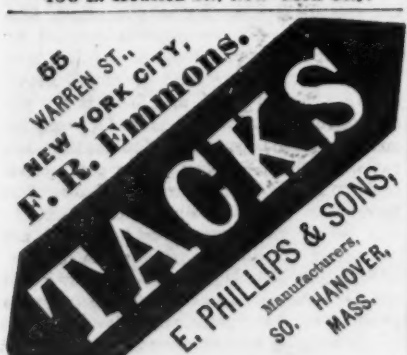
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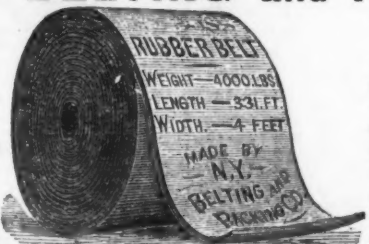
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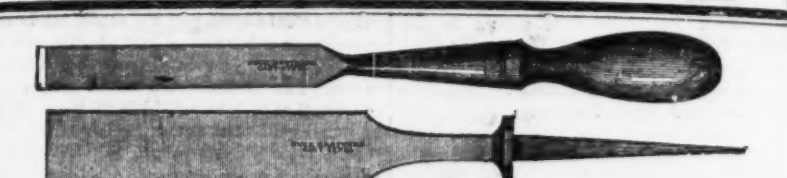
Pat. Jan. 26, 1869. PATENT ELASTIC Rubber Back Square Packing BEST IN THE WORLD. For Packing the Piston Rods & Valve Stems of Steam Engines & Pumps.

B represents that part of the packing which, when in use, is in contact with the Piston rod. A the elastic back, which keeps the part B against the rod with sufficient pressure to be steam tight and yet creates but little friction. This Packing is made in lengths of about 20 feet, and of all sizes from 1/4 to 2 inches square.

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## PHOSPHOR-BRONZE.

sensibly the tenacity and elasticity of steel, has been long recognized, but to more recent investigations is due the establishing of the fact that these effects are purely local, and can be therefore corrected, not only by annealing, but also by other and simpler mechanical treatment. The importance of this discovery to the adaptation of steel to riveted work can hardly be estimated. The impracticability of making use of the corrective agency of annealing, in riveted-girder work, for instance, is too self-evident to need discussion, while on the other hand, to resort of drilling rivet holes instead of punching them, to avoid the evil effects of this latter, as recommended by Sir Edward J. Reed, enhances the price of the steel considerably. The experiments of Lieutenant Barba, made at L'Orient, conclusively established the following facts, viz.:

1. That the effects of punching and shearing are essentially local, and spread only over a very restricted region, less than .04 inch on the edges of the punched or sheared parts in plates less than .5 inch thick.  
2. That the annealing will correct the alterations caused by shearing or punching.  
3. That the removal of about .04 inch of the metal from the punched or sheared edge will destroy the effects of punching or shearing and bring the metal back to the state it would be in if drilling or planing had been resorted to in the first place.

Table X gives the results of tests made by the writer at Watertown Arsenal, with open-hearth steel plates, to establish the comparative value of drilled, punched, and punched and reamed holes, &c.

TABLE X.—TEST OF O. H. STEEL PLATES WITH DRILLED, PUNCHED, REAMED, ETC., HOLES.

Carbon.	Description of	Average ultimate	Per cent.
Per cent.	Plate specimen.	tensile strength in lbs. per square inch of effective section.	Elongation of hole.
0.30.....	1/2 inch rolled plate, cut in planer on all edges. Strips 2 1/2 inches wide, 18 inches long.	Drilled, 1/2 in. diameter..... 98,966	29.
0.30.....		Punched, 0.935 in. diameter..... 100,700	27.
0.30.....		Reamed to 1/2 in. diameter..... 78,970	31.
0.30.....		Punched and annealed, 0.935 in. diam..... 66,108	3.3
0.40.....		Drilled, 0.6 in. diameter..... 99,747	15.6
0.40.....		Punched, 0.5 in. diameter..... 104,753	13.
0.40.....		Reamed to 0.5 in. diam..... 87,910	18.9
0.40.....		Punched and annealed, 0.6 in. diam..... 80,550	5.
0.50.....		Drilled, 0.4 in. diameter..... 85,963	29.
0.50.....		Punched, 0.4 in. diameter..... 89,043	26.
0.50.....		Reamed to 0.5 in. diam..... 84,951	31.
0.50.....		Punched and annealed, 0.45 in. diam..... 82,330	15.

The results given are, as in previous tests, averages, and are conclusive evidence of the restoration of strength effected by the enlargement of the hole by reaming. The bad effects of punching and shearing are due to the intense local pressure produced by the shears or the punch; in the first place, then, the limit of elasticity in the metal is exceeded, which, of course, is followed by loss of ductility; in the next place, this pressure causes a solution of the mechanically mixed carbon, and effects a real tempering of the parts subjected to these operations, and this causes the marked increase in hardness of the affected parts. To arrive at an estimate of the saving effected by punching and reaming over drilling, we give the subjoined tables XI and XII, which contain the results of trials made by Lieutenant Barba upon 10 plates, 0.31 inch thick, each plate weighing 600 pounds. These plates, symmetrical and in pairs, were to have the same number of holes; one series of 5 plates was drilled, the other series was punched and the holes enlarged.

TABLE XI.—DRILLED PLATES.

No. of plate.	No. of holes.	No. of working hours.	Remarks.
		Machine.	Workman.
1.....	256	18.30	15.10
2.....	220	15.10	14.30
3.....	110	9.0	9.0
4.....	132	11.30	11.30
5.....	134	11.0	11.0
Total	915	65.30	65.30

TABLE XII.—PUNCHED PLATES AND ENLARGED HOLES.

No. of Plate.	No. work'g hours of machines.		No. work'g hours of 1 workman.			
	Punch.	Drill.	Total.	Punching.	Reaming.	Total.
1.....	2.0	7.0	9.0	8.0	7.0	15.0
2.....	1.15	6.15	7.30	5.0	6.15	11.15
3.....	7.0	7.0	8.0	4.0	7.0	11.0
4.....	3.0	4.30	6.30	8.0	4.30	12.30
5.....	3.0	4.30	6.30	8.0	4.30	12.30
T.tal.....	8.15	29.15	37.30	33.0	29.15	62.15

The working expenses were then 65 hours 30 minutes for punching and reaming, or about 5 per cent. advantage for this last operation. It must be observed that the working expenses for punching comprise labor of one journeyman and three laborers handling plates, and as the latter's wages are less than the journeyman's, 5 per cent. economy is a minimum. The working hours of the machines were, for complete drilling, 65 hours and 30 minutes, and for punching and reaming, 37 hours 30 minutes, or 42 per cent. less in the latter case. These advantages can, of course, be greatly increased by special machinery, such as multiple reamers, &c.

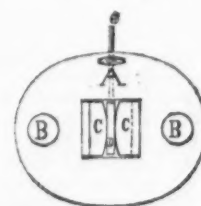
A Well Arranged Manufacturing Plant.—The huge cordage works of Messrs. Finley and Schlichter, near Philadelphia, now in course of erection, have several features of interest. The chimney stack, which is 20 1/2 feet high, is 13 feet square at the base, tapering to 9 1/2 feet at the top, and rests on a solid block of concrete, 30 feet

square and 5 feet thick. Over 350,000 bricks and four tons of hoop iron were used in its construction. It is claimed to be the highest chimney stack in the United States. The boiler is of the English Galloway pattern, compound type, 28 feet long and 7 feet in diameter, is of 300 horse-power, and was built at the Edgemoor Iron Works at Chester, under the supervision of C. H. Holt, Consulting Engineer of the works. The engine, which is of 5000 horse-power, was built by Robert Wetherill & Co., at Chester, and is considered of a superior character for economy in many respects. The driving wheel, which was also made at the works of Wetherill & Co., is 20 feet in diameter and weighs 80,000 pounds. The shaft is 17 inches in diameter and 17 feet long. A reservoir 250 feet by 100 feet in size, together with several tanks on the roofs of the buildings, capable of holding 100,000 gallons of water, are deemed sufficient to supply the boilers and to render efficient service in case of fire. The main building is furnished with three brick inclosed staircases, two in the corners and one in the center, and iron bridges lead from each upper story to the adjoining buildings. The machinery, which is of the latest and most improved pattern, is imported from the works of Lawson & Sons, Leeds, England. All necessary improvements will be completed in about a year, and the entire works will probably employ over 400 hands.

The production of crucible steel in England by the Siemens regenerative gas furnaces during 1881 amounted to 3500 tons, representing an increase of 450 tons on the output of the previous year.

## Gripping Device in Testing Machines.

Messrs. Riehle Bros., of Philadelphia, have recently introduced an improved gripping device in testing machines, which is undoubtedly of interest to those engaged in testing materials. It is particularly well adapted for holding flat specimens of iron or steel, preventing the test pieces from being pulled out of line or torn at the edges. This has al-



Gripping Device in Testing Machines.—Fig. 1.—Plan View of Clamp with Specimen in Place.

ways been a difficulty when wedge grips are used for testing purposes, and the new device undoubtedly supplies a long-felt want. It is well-known to those who have conducted experiments with machines for testing tensile strength, that it is of the greatest importance that the clamp which is used to secure the specimen under test in the testing machine should transmit the strain in a direct axial line through the material, without tendency

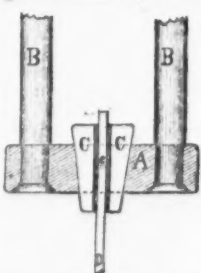


Fig. 2.—Sectional View of the Same Elements.

to lateral strains. In the clamp patented by H. Riehle, November 8, 1881, the wedges have their gripping faces slightly convex, or wedge-shaped, so that the grip will be strongest in the middle of the specimen, and weakest on the edges, so as to avoid the rupture of the edges through having the greater grip on the outside. In our engravings, Fig. 1 is a plan of the clamps with the specimen in position; the curve-faced wedges are marked C C; D is the specimen gripped between the



wedges; e is a guide pin which guides the specimen to the center of the testing tool. Fig. 2 is a sectional view of the same elements, and Fig. 3 shows a section of wedges with wedge-shaped faces. The variation of the wedge-face from a plane is much exaggerated in the cuts, in order to show the idea clearly. This form of wedge clamp is used by Messrs. Riehle Bros. in their testing machine and is giving entire satisfaction.



New York, Thursday, April 27, 1882.

New York, Thursday, April 27, 1882.

### RATES OF SUBSCRIPTION INCLUDING POSTAGE.

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In our Washington correspondence of last week we gave in *extenso* the recent decision of the Treasury Department on the subject of splayed hoop iron for barrels. The hoop iron in this case was cut to specific lengths or barrels, punched at one end, and splayed or flared to fit the barrel. The decision of



the department was that this was not a finished hoop, that it differed from the hoop iron cut to length and punched, which was the subject of Decision 4496, only in being played, and as it was not a completed hoop, it was to be regarded as hoop iron. This is the first victory that the manufacturers of hoop iron have had for some time, and they are correspondingly elated. Under the Treasury decisions at present in force, hoop iron cut to lengths and punched, hoop iron cut to lengths, punched and played to fit barrels, and cotton ties with buckle loosely attached, are all dutiable as hoop iron, but hoop iron cut to lengths, played to fit the barrel, punched at one end, and with rivets or studs at the other, or, as it is termed, a completed barrel hoop, and cotton ties with the riveted buckle, are dutiable at 35 per cent ad valorem. This would seem a "stand-off," but it is not. Very few cotton ties with buckles not riveted are imperfect, and the hoops that are brought in will have the stud or rivet in that is necessary to admit them at 35 per cent ad valorem.

#### Anglo-French Commerce.

English journalists pronounce the failure of negotiations for a renewal of the Treaty of Commerce with France, absolutely hopeless. Hopes virtually expired with the retirement of Gambetta from the Premiership of the French ministry. While it is admitted that cruel loss and damage may ensue to many commercial enterprises founded for the interchange of British and French commodities, which a higher tariff will exclude, the London Times does not believe the consequences will be of alarming import to British commerce. "It does not follow," says the editor, "that British goods will be banished from France because no treaty is henceforth to patronize them. Habit is powerful in the course of trade as in all else. French customers who have been used to British manufactures will continue to purchase them at the increased price. The mischievous effect of the raised tariff will be more perceptible in retarding the natural growth of trade between the two neighbors than in destroying a trade already rooted. That mischief itself will not last forever. When French consumers have had leisure to observe that they have to bear the weight of the customs their Government has put upon British manufactures, and when French producers have discovered that heightened duties do not expel those manufactures, the French Legislature will retract the imprudence of which it or its leaders are now about to be guilty." It would be in vain to attempt to disguise the fact, notwithstanding these hopeful auguries, that the British mind regards the new aspect of affairs with anything but complacency.

In marked contrast with the falling off in our balance of trade are the reports of the condition of British trade. The returns for the month of March show that imports increased, as compared with that month last year, £1,200,000, and exports increased £1,900,000.

#### The Ordnance Department and the Emery Testing Machine.

WATERTOWN ARSENAL, April 27, 1882.

To the Editor of The Iron Age.—DEAR SIR: My attention has been called to a letter in your issue of the 6th inst. signed by Gen. W. S. Smith, and last year's readers should be led to think that certain of his statements, which conflict with the facts as given in my letter of March 25, if allowed to pass unnoted, are permitted to pass unnoted because they cannot be successfully refuted. I beg to say a few words in reference thereto, regretting that there should be any necessity for my having to say anything in the matter. General Smith states in the letter referred to, that the testing machine contracted for by the board is larger than that ordered by me. I have the two contracts before me, and the specifications in each call for a "400-ton machine," to be tested by a compressive strain of 1,000,000 pounds. In order that General Smith may make good this statement, it is necessary that he should show that a ton in 1875 was greater than a ton in 1873, when I ordered the first machine. Again, he says that I should credit the making of the Emery testing machine to the board. I have never claimed the credit of having produced the machine as ordered by the board, but I do maintain that I ordered the Emery testing machine as it is now used, in 1873, 18 months before the board made its contract, and I have the necessary papers to prove it. The board should have all the credit it is entitled to for the contract which it made for a testing machine. I have no desire to interfere in regard to it. The rescinding by the board of the contract made by me in 1873, for a 400-ton testing machine, cost the Government \$10,988.79, for which it received no other equivalent than the rotating ram, or diaphragm apparatus, which is not, and never will be, used. Mr. Emery predicted at the time that such would be the case, and his prediction has been verified.

General Smith further says that I knew that the work of making tests was wisely postponed until the machine could be finished. On the contrary, I know that this work was not postponed, but tests to the amount of \$42,378 were made by the board. I did not challenge a comparison of my work with that of the board until the former had been harshly criticised, and then only in self-defense. It was not expected, however, that General Smith would claim that the board had done no work, when it is well known that it has made some valuable tests. General Smith claims that the testing machine has been constantly engaged, since the demise of the board, on investigations directed

to procure information which is specially of use to the Ordnance Department. To disprove this assertion, it is sufficient to state that the tests ordered by the Ordnance Department have been three, and cost precisely \$52.50. Besides these, I made some tests, at an expense of \$359.27, on the resistance of cast-iron cylinders to internal strains, which tests the Ordnance Department claim are of no value as referring to ordnance matters, and throw no light on the subject of the construction of guns. Private parties not connected with the army consider these experiments as of much interest and of great value to them in their business. All other tests have been of only general interest, and of no special use to the department.

According to General Smith's own showing, I had urged upon the Chief of Ordnance the importance of undertaking this work a year before the Society of Civil Engineers took any steps in this direction. What motives may have influenced the Chief of Ordnance in 1872, who was General Dyer, and not Col. S. V. Benét, as stated by General Smith, to ask for an appropriation for a testing machine I do not know. He certainly had good and sufficient reasons presented to him the preceding year. What course the Ordnance Department has pursued, other than that which is a matter of record, I have no means of knowing; it is, however, a well-established fact that the department would have had a 400-ton testing machine, like that now used at this arsenal, had not the Chief of Ordnance voluntarily relinquished it in order to co-operate with the Society of Civil Engineers in this work of making tests, and for doing which General Smith seems to think that the Ordnance Department was deserving of, and should receive, no consideration whatever, not even the trifling one of the presidency of the board, in recognition of its priority of inception and commencement of work in this field of investigation. I can but regard it as a matter of regret that the Ordnance Department had not declined to give up its 400-ton machine, and had not continued its investigations as originally contemplated. It would thereby have escaped suspicions which are believed to be unjust, and have been able to do a work creditable alike to itself and valuable to the Government.

T. T. S. LAIDLEY.

#### THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

##### FIRST REGULAR MEETING OF 1882.

The meeting was called to order in the Hall of the Franklin Institute, in Philadelphia, April 19, at 10 o'clock, President Thurston in the chair. The President called attention to the fact that there were at the present time 295 members on the roll, and that 35 names were proposed for membership, and would be balloted for later in the session. As these would probably be elected, he thought he was justified in saying that the present membership would amount to 325. Attention was called to certain features of the catalogue, among which were the lists of past officers and deceased members, &c., and he said that if no objection was made, these features would be continued.

During the past year the society has been regularly incorporated under the laws of the State of New York. A list of the papers for the meeting and an announcement in regard to the committees were then read. During this time the ballots were counted, and it was announced that the whole list had been duly elected. The first paper of the session was that of Mr. Eckert, upon "The Chronograph for Engineering Purposes, with the Hipp Escapement." This consists of a delicately adjusted cylinder, covered with a thin sheet of paper, carefully blackened. Points resting upon it make delicate tracings as it revolves. These points are controlled through electro-magnet by a time-piece and by the movements of the engine, so that not only the time, but autographic records at different points of the stroke are made. Much valuable information was obtained in the deep mines on the Comstock from one of these instruments. For example, in the investigation of the action of the long pump rods, the instrument disclosed the very interesting fact that in some cases the plunger was still when the engine above, on the same rod, was at its maximum speed at mid-stroke.

Mr. Woodbury gave a description, illustrated by a diagram on the blackboard, of a very effective chronograph which he had had occasion to employ. While not pretending to reach the accuracy of the one used by Mr. Eckert, it was a cheap and effective instrument, and he obtained very satisfactory results from it. The jar incident to most of the pump and other machinery, where it is necessary to use the chronograph, is sufficient to disarrange the instruments necessary for producing perfect regular motion, and hence it is almost, if not quite, impossible for one to obtain satisfactory results. This being the case the speaker abandoned the attempt to obtain a uniformly revolving drum and worked out the problem in an entirely new direction. The object of his work was to measure the circular velocity of the fly-wheel of a pumping engine in Lowell. That motion was irregular and the cause of the irregularity and its amount were both to be investigated. The apparatus was of exceedingly simple construction, consisting of a 30-inch wooden wheel covered with velvet, and connected with the main shaft so as to be driven at precisely the same speed; consequently pulley and fly-wheel would both revolve at the same varying speed. Around this pulley a roll of telegraph paper was carried, fed to, and taken from the velvet surface by means of two small rollers. After having the slip of paper run about the wheel at the same varying velocity as the fly-wheel itself, the next problem was to make a record upon this at regular intervals of time. This was done by taking a common marine clock making 100 beats per minute, attaching a small wire to its balance in such a way that the wire alternately touched two drops of mercury, making and breaking an electric circuit. By means of

this circuit and suitable electro-magnets, records were made upon the paper at regular distances of time, which, by the varying velocities, were of course spaced at irregular distances. As the clock kept good time and continued to do so during the experiment, as was indicated by the hands, which were not removed, the regularity of the time interval was assured. At each of the dead centers another electro-magnet and circuit was used to indicate upon the paper the times when the piston reached the ends of its stroke, thus giving all the data necessary to calculate the variations in each revolution. This apparatus, which cost only about \$10, and was simple in the extreme, gave the means for measuring with an ordinary steel rule the time to the eight-hundredth of a second. One set of marks upon the telegraph paper gives the revolutions by themselves, while the others give the hundredths of a minute. This apparatus, which is quite simple and inexpensive, has been applied very successfully to several other engines as well as that named.

Professor Thurston then read his paper on the Various Efficiencies of the Steam Engine, or, perhaps, we should more correctly say, gave an illustrated abstract of the leading points which he made in it. This was substantially similar to the note in regard to it which we have already published in the columns of The Iron Age. The morning session was adjourned at the conclusion of the paper.

#### AFTERNOON SESSION.

The afternoon session was devoted to a memorial session for the late Alexander Lyman Holley. Before calling upon the memorial committee for their report, Professor Thurston read Mr. Holley's last communication to the society, his tribute to Worthington. This pleasant, keen, genial and altogether delightful analysis of character might be applied, the President said, most appropriately to Holley himself. The President spoke at the conclusion of its reading in most eulogistic terms of Mr. Holley's career as an engineer and scientific man, and detailed at length the plans for erecting a memorial to him in Central Park, New York. The President then called on Mr. J. C. Bayles to deliver the memorial address. He reviewed in detail the career of the deceased, both as an inventor and engineer, and literary man. The irresistible charm of his sunny temperament, his brilliant, genial good fellowship, his courage in daring to put confidence in the sincerity and honesty of others, his own undoubted sincerity and the universal love with which he was regarded, were all touched upon at length. The session was a most successful one, and tributes and reminiscences were contributed by a large number of speakers, among whom were Mr. Furney, of London; Senator Eckley B. Cox, of Luzerne County, Pa.; J. C. Hoadley, Boston; J. F. Holloway, Cuyahoga Steam Furnace Co.; Robert W. Hunt, Superintendent Albany and Rensselaer Steel Works; William Metcalf, of the firm of Miller, Metcalf & Parkin, Pittsburgh, Pa.; Charles T. Porter, of the Southwark Foundry and Machine Co.; Coleman Sellers, of William Sellers & Co., Philadelphia; William T. Trowbridge, professor of mechanical engineering, Columbia College; Lycurgus B. Moore, American Machinist, New York; W. Barnett LeVan, Philadelphia; William E. Partridge, Associate Editor of The Iron Age, New York. Although the meeting was a sad one, yet all who spoke had some pleasant memory, some delightful reminiscence or some kindly word to say of one who is gone, and whose place in the hearts of all the members has been a very large one. At the close of the session the following resolutions were presented by the Committee:

Whereas, We are called upon as a society to give expression to profound and sincere sorrow in the death of our vice-president and friend, Alexander L. Holley,

Resolved, That we mourn the death of our friend as an irreparable loss to the profession and as a sad bereavement.

Resolved, That in the death of Alexander L. Holley the country has lost an engineer whose genius and industry have greatly added to our industrial development, and to whom all branches of the engineering profession are profoundly and permanently indebted.

Resolved, That we shall ever hold Alexander L. Holley in cherished remembrance as one whose life and example are an inspiration to high aims and worthy motives, and who gave a new dignity to all branches of the profession, and that we remember our association with him as something which made our lives happier and our work lighter.

Resolved, That the secretary be directed to forward a copy of these resolutions, with the report of our memorial services, to the family of Mr. Holley, with assurances of the deep and tender sympathy we feel for them in their bereavement, and that the Committee of Five appointed by our council, be directed to co-operate with the committees appointed by the other societies in furthering the work of securing a worthy and permanent Holley memorial, in whatever form may be deemed most appropriate and calculated to keep his work and example before the rising generation of engineers.

A memorial session of the societies is to be held, and the joint convention will be held in New York at as early a date in the fall as may be practicable. Professor Raymond, in whose hands the duty of preparing the biography was placed, desires as much time as possible for his work, and the date of the meeting will be as late in the season as may be; consequently the time at which the next meeting of mechanical engineers will be held cannot be announced.

#### RECEPTION.

The evening was devoted to a reception, given to the members of the society by prominent citizens of Philadelphia, at the Academy of Fine Arts. The Reception Committee of citizens consisted of George B. Roberts, A. I. Drexel, George W. Childs, George H. Boker, Dr. William Pepper, and Fairman Rogers. The committee of ladies consisted of Mrs. Frederick Graff, Mrs. Coleman Sellers, Mrs. Joseph Wilson, Mrs. Henry Wilson, Mrs. S. J. McCloud and Mrs. S. W. Coulton, Jr. Among others on the General Committee of Arrangements, there were Frederick Graff, Coleman Sellers, Eckley B. Cox and Washington Jones.

Altogether, the reception was a most

delightful one, and was most heartily enjoyed by the members. The rooms are most admirably adapted for the purpose, while the magnificent collection of paintings added greatly to the charm of the evening. It will long be remembered as one of the most delightful assemblages by the members.

#### THE EXCURSIONS.

Thursday was devoted entirely to excursions to various points of interest in and about Philadelphia. At about 10 o'clock most of the members, together with invited guests and others, were on the Narrow Gauge Railway wharf, from which the start was to be made. It was at this wharf that a terrible boiler explosion took place a short time since, and one of the buildings on the opposite side of the street bore evidence of the destructive force of the explosion. It was badly shattered, and the corner with a portion of the roof was covered by a huge canvas, which extended nearly to the ground.

The steamer arrived somewhat late. After the party was on board and salutes exchanged with most of the passing craft, the steamer was headed for Messrs. William Cramp & Sons, the well-known shipbuilders, where a landing was made. Here there were sufficient objects of interest to occupy a party for a whole day. A comparatively short time, however, could be spared for the visit. The visitors were shown the method of bending the frames for iron ships, and the subsequent operation of giving it the proper angle. An interesting machine was at the same time exhibited by which it was possible, by passing the frame through a pair of disks, to obtain any desired angle. One of the vessels on the stocks, for the coal trade upon the California coast, was especially interesting as showing improvements in construction. She has a double bottom, with tanks for water ballast. These tanks are arranged upon an improved plan. Beneath the engines and boilers the frames are put in very close, and the whole bottom forms a very strong bed. All the surfaces in the bottom were thoroughly painted and the bottom plates cemented, to prevent the action of the water upon them. The keelsons and thwart-ship partitions in the double bottom were all in place and ready for the top plates. The vessel is somewhat broad of beam, but the depth of the ballast tanks and the number of keelsons running through them will make her very stiff. At the bilges the tanks, instead of running horizontally into the outside plates, are carried down and strike the skin at right angles. The vessel was hardly in a sufficient state of advancement to enable one to judge very closely in regard to her general design, but, from what was shown, the visitors obtained a most favorable impression. The forges and machinery seen in various parts of the works were the subject of much commendation. Lying at the dock was a new steamship, the Queen of the Pacific, just receiving the finishing touches of the joiners and the final work in the engine room. This vessel has a beautiful model, and although of comparatively light burden, is likely to be extremely fast, the engines having some 3000 horse-power, with ample boiler room. The engines themselves were the objects of considerable curiosity, having many features of novelty. They consist of a pair of high and low-pressure cylinders with piston valves. The high-pressure engine has a single valve with the cut-off working inside the main valve. The low-pressure cylinder is supplied from the reservoir by two piston valves driven from a yoke. The object of this construction is to get the cylinders closer to each other. The engine is controlled by a Westinghouse governor attached directly to the link. This method of controlling the speed has many advantages over those in which the governor is attached to the throttle valve, as it has only the momentum of the engine to contend with, while the throttle-valve method gives the engine all the steam that may be in the pipes between the throttle and cylinder, as well as that in the reservoir. It is intended to drive the engines at 80 revolutions, and, if possible, at 90. All the bilge pipes between the compartments and all of the valves in these pipes are brought into the engine-room, thus enabling the engineer, without leaving the engine-room, to control all the valves leading to the different compartments, and to pump from any one at pleasure. The engine is provided with an independent centrifugal circulating pump. The engineer's station is on the lower deck of the engine-room, and he is at the same level as the main journals. The cabins of the vessel were superb, the fittings being of ash trimmed with mahogany. The door panels were of walnut burl and the panels in the wainscoting of chestnut, with an elegant carved design in mahogany upon them. The staterooms themselves are of unusual size, and the berths, which are adjustable, are very wide. Electric lights and electric bells are used throughout the ship. The smoking-room, which was in an advanced condition, will be most elegantly finished in mahogany. Altogether, the joiner work is said to be the handsomest ever put on board a steamship. As time was pressing, the visitors were scarcely allowed to more than glance at the more interesting features and were hurried on board of the steamer. After taking a look at the new elevator and its wharf from the steamer's deck, the bow was turned down the river toward League Island Navy Yard. During the trip to that point the time was very pleasantly spent and many interesting points of mechanical construction were discussed. At League Island the speed of the boat was reduced and visitors had an opportunity of seeing the old monitors anchored there. In order to return to the city it was found necessary to omit stopping there, and the party went directly to John Roach's works at Chester. Here the mast-shears and boilers of ocean steamers were the first objects of interest. The visitors scattered pretty widely through the works, and it was almost impossible to follow any connected plan in seeing the sights. One of the first objects of interest was the new steamer Pilgrim, whose paddle-box frames towered above everything else in the vicinity. An inspection of the hull showed that she is very sharp, and for a flat-bottom boat, has a very easy model. The galloway frame is of the box pattern, and is of iron. The guards, instead of being supported by the sponsons in the ordinary

fashion, are held in place by brackets. This will undoubtedly make the vessel much easier in a seaway than a guard supported by sponsons alone. Owing to the shortness of the remaining time, the party was hurried on board the steamer and started for the city. On the way up a collation was served, which was heartily enjoyed by the excursionists. The trip was enlivened a part of the way by a lively race between a new tug and the Wilmington, the excursion steamer, in which the latter proved herself not only a comfortable, but a fast boat, distancing her competitor after a very sharp brush. On arrival at the wharf a considerable portion of the party decided to look at some of the engineering works of the city. Their first visit was the Baldwin Locomotive Works. After looking at the elegant offices, inspecting the drawing-room with some of its notable drawings, the party was taken, under the direction of Mr. Barnett Le Van, through the works themselves. The assembling shop was a point of much interest, as several of the Wootton fire-box locomotives were being put together, and an opportunity was given for seeing the internal construction of these somewhat remarkable boilers. The visitors were then shown through some of the most interesting parts of the works, among which was the boiler and smiths' shop and the electric light engine-room. From the Baldwin Works the party proceeded to William Sellers & Co., where they were shown the more interesting features of the establishment, among which was a little Porter-Allen engine, seemingly hardly large enough to develop 20 horse-power, yet was actually doing 60 horse-power, running at a very high rate of speed. The number of revolutions we do not now call to mind. Just before closing time the party found themselves at the works of A. Whitney & Sons. Here a peculiarly interesting trial was made of a machine for boring car-wheels. Two cuts were taken through the hub and the hub faced off in 5 minutes and 15 seconds, which time included changing and adjusting the tools. This was a Master Car Builders' standard wheel, 4½ inches diameter in the axle seat and 7 inches in depth. Even this time would probably be shortened in regular work.

(To be Continued.)

#### WASHINGTON NOTES.

(From Our Own Correspondent.)

WASHINGTON, D. C., April 26, 1882.

There is considerable probability that the end of the Tariff Commission discussion will not be reached during the present week. There is a desire on the part of the Committee on Elections, supported by the general sentiment of the House, to dispose of several of the more important election cases without further delay, notably the famous Lynch-Chalmers case, of the "Shoestring" District of Mississippi. These will occupy several days. It is also intimated that at least four of the members of the Committee on Ways and Means have expressed a desire to be heard after the general debate has been concluded. These gentlemen are Judge Kelley, chairman of the committee, ex-Speaker Randall, and Representatives Tucker, of Virginia, and Morrison, of Illinois. The last two are pronounced free traders and will oppose the bill, demanding that not only direct action should be taken by the committee, but that it should be done immediately. Judge Kelley and ex-Speaker Randall are in favor of the bill, considering it as not practicable to do justice to the subject in the remaining days of the present session, and that a comprehensive report of facts collected by a commission would at least add to the information of the committee on the important subject of revision.

The members of the Committee on Ways and Means are beginning to talk quite freely on the subject of a "little" tariff bill. At an informal conference recently, it was practically decided to prepare a bill as proposed earlier in the session, to include the provisions in the McKinley bill, to adjust the duties on iron and steel and other articles which seem to demand immediate attention. There is also a disposition to consider the question of free raw materials. There are some members of the committee who favor a liberal policy toward raw material, provided it would not interfere with home industry in similar products. Judge Kelley has already expressed himself in favor of extending the free list in raw materials, and preserving the duties on manufactured articles at their present figure, or to so adjust them as to meet the requirements of new forms of manufactures not known at the time of the enactment of the present tariff. The latter fact is the primary occasion of all the confusion in the proper classification of this class of articles, and encourages the attempts, under cover of new commercial terms, to evade the tariff. The greatest danger to a little tariff bill will be the efforts to saddle upon it a number of articles other than those to be named in the committee bill, and which would be likely to weigh it down and destroy it altogether.

#### SECOND HEARING ON THE SIEMENS PATENTS.

The second hearing before the Committee on Patents, in the Siemens regenerative gas furnace patent extension, took place on Thursday morning last, and to-morrow the hearing will be continued and probably closed. Mr. Charles S. Whitman, attorney, of this city, appeared, as at first meeting, in behalf of Messrs. Richmond and Potts, of Philadelphia; the agents of the Messrs. Siemens and Messrs. Bakewell and Kerr, and Mr. Geo. H. Christy, of Pittsburgh, as attorneys for some of the manufacturers who are now using these gas furnaces at their works, and for some others who contemplate the erection of this description of furnace. Iron and steel manufacturers throughout the country who have paid large sums of money for the right to use the Siemens gas furnaces, and who, it is claimed, employ a greater number of them than are in use at the works of those who are remonstrating against the extension of the patents, were represented by Attorney Whitman, and by petition praying for the granting of the extension. The time of the session of the committee was taken up by Mr. Whitman in behalf of, and by Mr. William Bakewell in opposition to, the extension. James Park, Jr., of Pittsburgh, a manufacturer using these furnaces, argued in favor of the extension,





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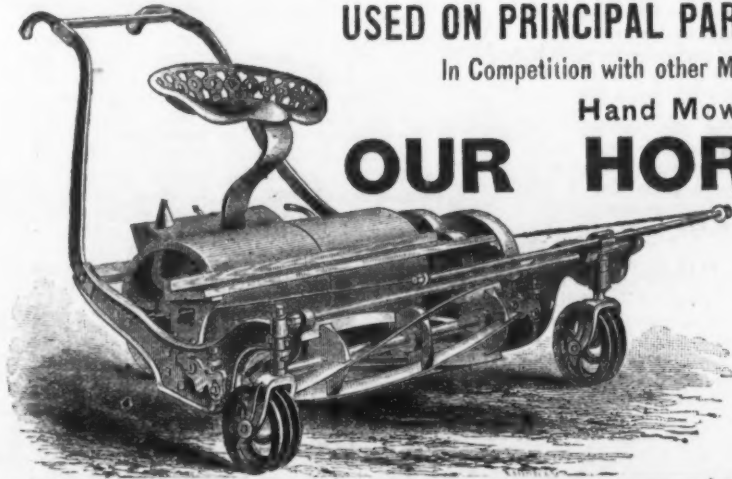


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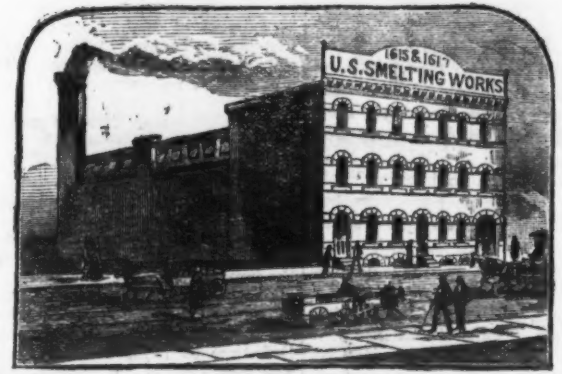
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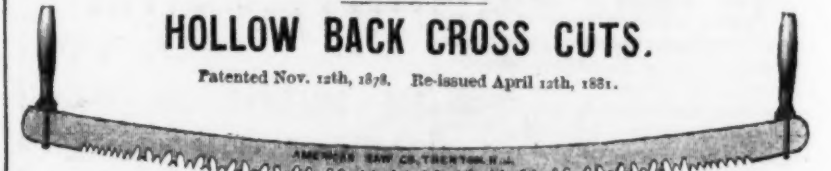
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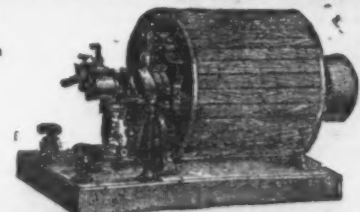


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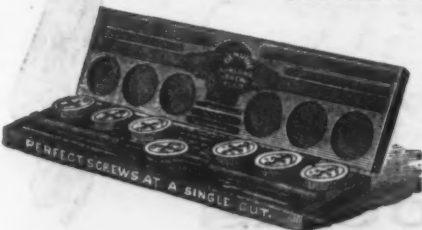
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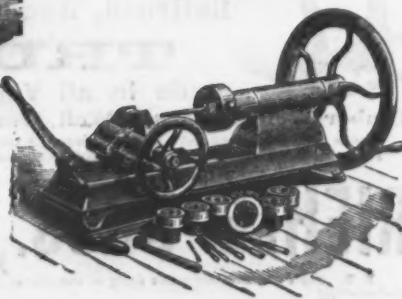
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expressing the belief that the iron and steel industries of the country would be benefited by having the control of the furnaces remain during the coming seven years under the direction of the Messrs. Siemens and their agents representing them in this country, whose great knowledge of metallurgy and the appliances required to aid in its success and advancement, would result in greater advantage to this important industry than the aggregate sum which would be paid for the use of the furnaces. He expressed his willingness to pay for such additional gas furnaces as his firm might require, and gave it as his belief that those who have already paid large sums of money for the use of the patents are entitled to some consideration and protection. He estimates that the claim made by the patentees, that a saving of \$25,000,000 in fuel and saving on loss by oxidation has been secured to the manufacturers of this country, is greatly underrated, and as it is shown that the patentees have netted but a little over \$250,000, they should be encouraged by being allowed to continue receiving such additional income from the invention as will encourage them to invent further improvements and proceed, as heretofore, in the education of young men until they are qualified to take charge of their furnaces. He said that it would be difficult to estimate the great advantages this country has gained through the graduating of young men, brought up, through the instrumentality of the Messrs. Siemens, to the knowledge of taking charge of these regenerative gas furnaces. He declared that the motives actuating him in advocating the extension of the patents were not at all selfish, but were influenced by the desire to secure for the manufacturing interests of the country a continuance of Dr. C. William Siemens's assistance in the development of the iron and steel industries, believing as he does that all the additional receipts that may be secured by the Messrs. Siemens for the use of their gas furnaces will be refunded more than tenfold by the development of the great industries their skill has already so greatly advanced. He said it is well known that the Messrs. Siemens's inventions have not been so gratefully appreciated on the other side of the Atlantic as they deserved to be, and therefore we on this side should do all in our power to encourage these great scientists to expend their energies with us, and that when we know, as many of our iron and steel manufacturers do, the great importance it would be to the country, in case success should attend the efforts to manufacture iron direct from the ore, all should be willing to extend to the Messrs. Siemens all possible assistance in bringing to a successful issue the production of malleable iron direct from the ore, by the Siemens' regenerative gas rotator principle, the full accomplishment of which would far more than compensate the iron and steel interests for all that might be collected for the use of the patents.

The introduction of the Siemens regenerative-gas principle has not yet made any headway in this country as applied to the manufacture of glass. It is well known that owing to the expiration of the Siemens patents in England, Dr. C. William Siemens has not given continued attention to improvements calculated to result in great improvements in furnaces needed for the full success of this industry. The Messrs. Siemens, it is further claimed, have expressed a great desire to be encouraged in efforts to introduce various improvements in the construction of furnaces suited to glass melting, and their friends say should they secure an extension of their patents the manufacture of glass in this country would receive great advantages and a decided impetus.

On the ground of economy, the petitioners claim a saving on 216,585 tons of crucible cast steel, produced by these furnaces since their introduction..... \$2,168,050  
On 327,400 tons of open-hearth steel at a saving of \$20 a ton..... 6,548,000  
On iron and steel, heated in these furnaces, 2,752,228 tons at a saving of \$2.50 per ton..... 6,880,570  
Iron puddled in these furnaces, 49,734 tons, at a saving of \$2 per ton..... 99,468

Making a total saving..... \$23,195,018  
The petitioners concede that no royalties are now paid in England, but do not consider that an argument why they should cease here. The bill gives to all parties the free use of any furnace constructed between the time of expiration of the patents and the date of the bill going into effect, should it pass. It is claimed that this concession would place such furnaces, without charge, on the same footing as those that have paid.

The Chairman of the Committee stated to the correspondent of *The Iron Age* that he desired to close this question as soon as possible.

The Secretary of the Treasury expected to dispose of the forged axle case on last Saturday, and had the papers before him, but owing to interruptions was compelled to lay them aside. He expects, however, to be able to reach the case again within a few days. Some new information has been submitted which will have to be considered in connection with that already briefed.

**The Future of Iron.**—A well-known French steel-maker, discussing the future of iron, recently made the following remarks, which deserve some attention as representing the views of a practical man on this subject: "Those who are occupied in the manufacture of Bessemer steel know how difficult it is to obtain with regularity the extra soft steel employed for boilers in the French navy. Such metal appears only to be made in the Martin furnace, and even then it is necessary to employ picked material in its manufacture. But by the new Bessemer dephosphorizing (Thomas-Gilchrist) process, steel of an extraordinary degree of softness can be obtained with the greatest facility, and at a price less than that of ordinary steel. By heating a pig containing from 1.5 to 2 per cent. of manganese we obtain, after the decarbonization and dephosphorization is finished, a non-oxidized metal, which does not contain more than traces of carbon or manganese. If it is desired that the steel should be entirely free from any tendency to red-shortness, we may add from 0.25 to 0.50 per cent. of a rich ferruginous ore to remove any traces of oxygenization. The only precaution to be taken to obtain a soft steel is to choose pig (if direct working be employed) which contains sufficient manganese

(with 2 per cent. as a maximum), or to make a suitable mixture of pigs if cupolas be employed. But this will be by no means the one outlet for dephosphorized metal, for up to the present time the high price of soft steel has been the great obstacle which has prevented many people from employing it in construction. But by this new process soft metal can be produced at a less price than ordinary (puddled) iron; there is, therefore, no longer any reason (apart from routine) why steel should not be employed in all cases in place of iron, to which it is so much superior in strength."

### United States Tests of Materials.

The following is the memorial to Congress concerning the appointment of a commission to test materials used in construction, to which signatures are now being solicited:

The undersigned, members of the American Society of Mechanical Engineers and other citizens, respectfully represent that under the authority given by an act of Congress, approved March 3, 1875, the President of the United States appointed a board to test iron, steel and other metals. That this board made a large number of chemical, physical and mechanical experiments, and built a testing machine which has no equal; but that its term of office expired, by limitation of law, June 30, 1879.

That the work of this board was of the greatest value to all the engineering and constructive sciences, but that its term of office was so very short that a large amount of work of vital importance, both to the United States Government and to private citizens, yet remains to be done.

That it is of the greatest importance, both to the consumers of all materials used in construction, as well as for the public health and safety, that these materials should be used to give the greatest amount of strength consistent with the most economical use of the metals, for which purpose it is necessary that all the materials used in construction should be tested.

That the tests heretofore made on these materials have been for the most part made on specimens of diminished area, and under such conditions that the tests are not comparable.

That very many of the tests, which were made the basis of the formulae upon which engineers rely for their calculations, have been made in material manufactured under different conditions from those which exist in this country, and that this fact, together with that above mentioned, of the tests having been made on specimens of diminished area, make their conclusions doubtful.

That the new metallurgical processes which have been invented in the past 25 years produce metals of a quality altogether dissimilar to those formerly tested, and that it is most desirable that information should be had relative to qualities of metal and materials used in construction, which were almost unknown when the former tests were made.

That the tables of factors of safety now in general use were constructed under conditions which no longer exist, and that it is for the interest of the United States Government—which is the largest consumer of metals and constructive materials in this country—to have these factors redetermined, as the result will undoubtedly be, that a diminished quantity of material will be used in a much safer form.

That, while it is undoubtedly for the interests of corporations and private manufacturers to make these same tests, it would be against their interests to publish them, when made, and that the constant repetition of the same experiments would consume a large amount of capital, but would add nothing to the general knowledge of these materials, and that the absence of this knowledge has undoubtedly caused not only much destruction of property, but also the loss of many lives.

That the knowledge which it is desirable to obtain, can best be arrived at by the appointment by the United States Government of a commission of skilled experts, appointed by the President, with the sanction of Congress, with a sufficient amount of funds at their disposal, to make experiments on members of composite structures of full size, and on the structures themselves—to determine not only what is the best quality, but also the best form in which to use the materials—whose duty it shall further be, to examine into the laws which apply to the safe use of all kinds of materials used in constructions and to deduce from their experiments formulae and rules for the best and most economical use of all such materials.

The prayer of your memorialists therefore is, that your honorable body will empower the President of the United States to appoint a commission from among experts in the manufacture and in the use and the investigation of materials used in construction, whose duty it shall be to plan and execute the needed investigations and tests upon materials used in the manufacture of machines, buildings, bridges, and other constructions, to deduce such rules from them as will lead to the greater safety of the structures, and economy in the use of the materials of which they are made. And your memorialists further pray that such appropriations may be made by your honorable body as to enable the commission, when appointed, to make the tests and experiments on full-sized parts of structures, as well as on the structures themselves, and also to construct such machines as may be necessary to make the tests, and also to secure the services of such skilled experts as may be necessary to carry on the experiments.

And your memorialists will ever pray, &c.

Speaking of the recent decline in steel rails, somebody tells a good story about Jay Gould, as follows: "Last October he calculated that he should need about 70,000 tons of iron and steel rails during the ensuing 12 months. He accordingly purchased that quantity. A month or so ago, prices having begun to go down, Mr. Gould suddenly threw 40,000 tons of his recent purchases on the market, losing an average of \$1.50 on each ton sold. Immediately there was the biggest sort of a tumble in prices, and Mr. Gould was able to buy back his 40,000 tons at from \$4 to \$5 less per ton than he had paid last Fall, a net profit of about \$3 per ton through his late sales."

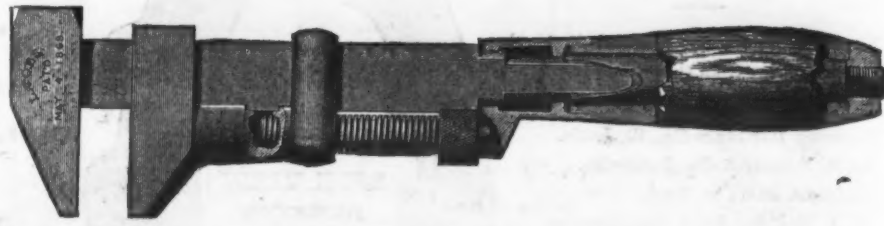
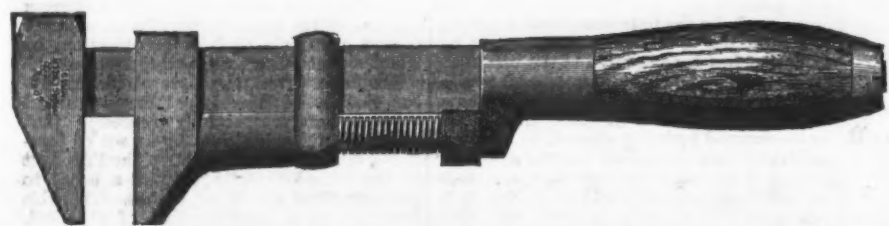


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MANUFACTURERS OF THE

**ORIGINAL GENUINE IMPROVED PATENT SCREW WRENCHES.**

ESTABLISHED 1839.



We discarded the old Nut attachment nearly two years ago and applied the better device we are now using (covered by patent) for preventing the back thrust of the ferrule. The superiority of this invention over all others has been fully established by practical test. By reference to above cut (sectional view) our improved method will be readily understood.

We make the shank of our wrench about double the size of those in other screw wrenches, leaving it full size, and strength by not cutting a thread.

Our Ferrules are made with two bearings, both fitting the shank.

An Iron Tube of sufficient strength to resist any pressure that may be put upon it, is fitted to the shank, one end resting against the lower bearing in the ferrule, the other against the enlarged Tip or Nut at end of handle, all rigidly held in position, the wooden handle made to fit exactly over the Iron Tube, forming a solid combination of Wood and Iron, preventing any possible displacement of the ferrule from hard usage. All our Wrenches are made with straight Bar, full size, the extreme length. The Jaw is made with ribs on the inside, running full length of the Jaw, which, in connection with the projecting sides, both secured by patent, are fully equal to any strain the Bar may be subjected to. We have also enlarged the barrel of the Jaw to take a larger and longer screw, enabling our Wrench to accommodate a larger Nut than any other manufactured. We make our goods of the very best material, thoroughly case-harden, and warrant every Wrench.

Manufactory at WORCESTER, MASS.

Warehouse, 97 Chambers and 81 Reade Streets, NEW YORK.

**DURRIE & McCARTY, Sole Agents.**

**CHAPLIN'S PATENT**

TRY  
SQUARE  
AND  
MITRE,

SPIRIT  
LEVEL  
AND  
PLUMB.

**A CARD.**

This Tool is manufactured under the original patent granted O. R. Chaplin, May 8, 1866, renewed May 4, 1880, for a Combined Square and Bevel, having an adjustable or sliding blade drawn to its seat by a clamp bolt. The public are hereby cautioned against the sale or use of a similar tool made and put into the market by another party, fraudulently claiming the invention as his own, under the name of "Starratt's Patent Adjustable Square." Proceedings in the U. S. Court for the District of Massachusetts were commenced against said party for infringement of the Chaplin Patent in July, 1880, and a final hearing was reached at Boston the second week in January last. The case now only awaits the arguments and decision of Judge Lowell. The aforesaid pretended inventor has recently commenced a counter suit against us, apparently for the express purpose of trying to frighten dealers by threat of suit for damages from handling the Chaplin Tool. All we have to say to the trade in this matter at present is, that we shall firmly maintain whatever rights the Courts may establish in our behalf, and shall protect and defend all parties whomsoever in the use and sale of the Chaplin Tool manufactured by us.

**STANDARD TOOL CO.,**  
ATHOL, MASS.

SOLE MANUFACTURERS AND OWNERS OF PATENT.

**SELF-BINDERS FOR THE IRON AGE.**

**RUSSELL'S  
COMMON SENSE  
BINDER.**  
(PAT. JULY 31 1877.)

**PRICES.**

Full Cloth.....\$1.25  
Half Roan.....1.50

We are now prepared to supply our subscribers with an excellent self-binder for their papers, a cut of which is annexed. We call attention to the low prices at which it is offered.

Address all orders to  
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Price Lists sent on application.

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ventor Expert,  
CINCINNATI, OHIO.

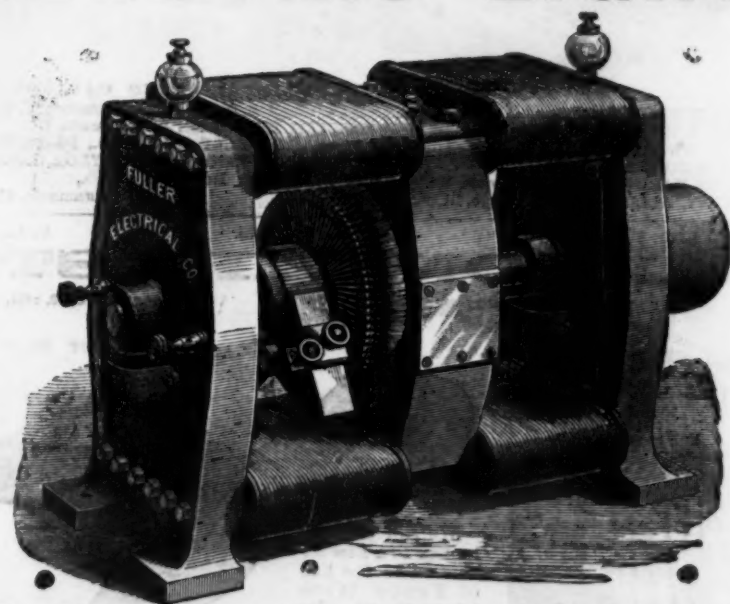
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BUFFALO, N. Y.,  
Manufacturers of

R. R. Track Scales, Hay Scales, Coal  
Scales, Grain Scales, Platform  
Scales, Counter Scales, &c.  
Send for price list, stating what you want

**TELESCOPE TUBES.**

Fine Mandrel drawn Tubes, from Brass or Ger-  
man Silver. Tubes for sliding one within the other  
made to order. Manufactured by ROBT. T. DEA-  
KIN & CO., 500 N. 12th St., Philadelphia, makers  
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THE FULLER ELECTRICAL COMPANY, having perfected their system of Electric Lighting, are prepared to furnish the Improved Gramme Dynamo Electric Machines and Electric Lamps, either for single lights or for from 2 to 20 lights in one circuit. This apparatus is unexcelled for durability, steadiness of light and economy of power, and requires less attention than any other.

For price list and further particulars apply to

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Railroad, Wagon, Box and Other  
**TRUCKS**  
Made in all Varieties and Sizes.  
Timber Well Seasoned, Well Ironed, and Substantially Framed.  
Please send for Prices and Sample Orders. A trial will secure your custom.  
Price Lists of Scales and Testing Machines furnished free upon application.

**RIEHLÉ BROS.,**

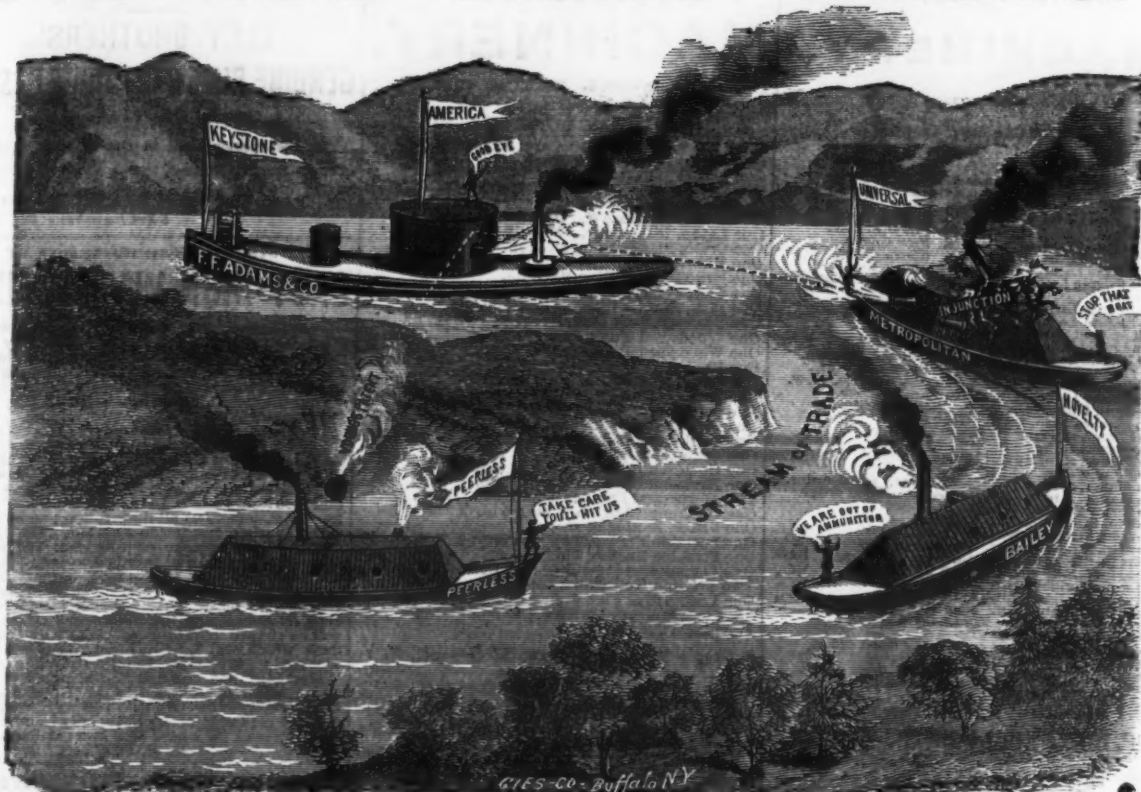
Store, 4th above Chestnut,  
Works, 9th above Master,

{ PHILA.

N. B.—Tests of materials made daily at our works, and certificates furnished. Reports copied and kept confidential.



# IN HOC SIGNO VINCES.



workmen and employees; and also that said injunction shall restrain the said respondents, or either of them, from suing any of the customers or agents of the said complainant, and that not more than one suit be brought on any one of said patents, until the same has been declared good and valid, and that the goods of the complainant are infringements upon the same.

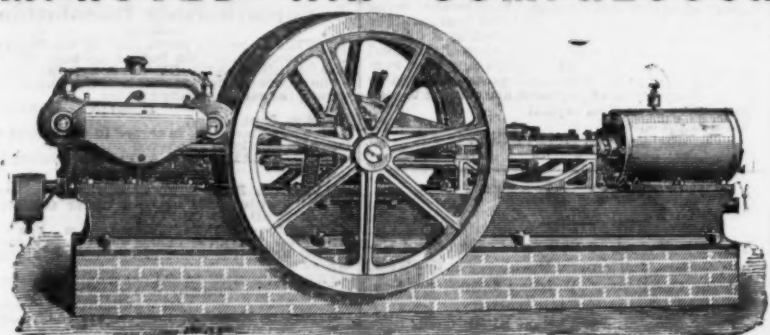
The above prayer was granted without reservation. The defendants attempted to defend by stating that the reason they sent out their circulars was that they could not obtain evidence on which to sue us; that they could not find any one who was willing to state that they bought the wringer called the "America" from us; this was their excuse. But as we stated we had sold thousands of the wringers, the Judge said if we would acknowledge that the wringer that was then on exhibition in Court was made by us it would be sufficient, which we very readily did, and that settled the matter. Now they advertise that we were "compelled to comply with this order." "ORDER!!!" THERE WAS NO SUCH "ORDER," indeed, it did not require more than a suggestion from the Judge. We had no hesitation in acknowledging that we made and sold the wringer called the "America," in fact, we had so stated in our bill, and we are yet proud to admit that we have made and sold many thousands of said wringer. It will not be necessary for any court to order us, or for us to be "compelled" to acknowledge this fact. Our opponents must be hard pressed not to find something more tangible to offer than the silly excuse that we were "compelled" to furnish a wringer as evidence, so they could sue us. If they had taken the trouble to write us for one we would have gladly sent them a wringer and admitted we made it, and had also sold thousands of them. We expect they will sue us, and we expect to successfully defend said suit, and are ready to give bonds to the amount of \$50,000 to pay all damages in case they obtain a decree against us. They state in last week's issue of this paper that they have commenced two suits for infringements. It is rather astonishing that we have not, as yet, been apprised of it, as we volunteered to accept service and save them marshal's fees any time they wanted to sue. We wish it distinctly understood by our customers that if they sue more than once on each claim, as prayed for in the bill, we shall pursue our remedy under the injunction. We shall meet and defend any suit they may bring against us or any one of our customers, and if any one of our customers wish us to give bonds to indemnify them against loss, we shall be very glad to do so.

We would again call attention to our advertisement in *The Iron Age* of the 13th of April, on page 27. We would especially have you remember that we sued the parties and obtained all we asked for, and they will not care to sue our customers but once, as we shall immediately insist on their arrest. We are the ones they SHOULD sue, if any one. All will agree with us on this point. We are the only ones they MUST sue, if any one. This bill sets forth clearly.

**F. F. ADAMS & CO., LIMITED, Erie, Pa.,**

MANUFACTURERS OF THE "KEYSTONE," "AMERICA," and all kinds of Wooden Frame and Iron Frame Wringers; also Bench Wringers, Washing Machines, &c., &c.

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SELLS AT SIGHT.

Directions.—To fill the cylinder, push the latch-bar from one of the uprights—it will swing out like a gate—slip the cylinder off to fill it with matches. To get a match, revolve the cylinder slow and let it rest on the top center and let go, a match will be found on the bar.

For State rights apply to  
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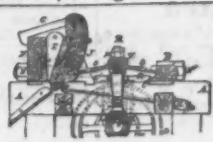
CAPACITY 1 A TON A MINUTE.  
DON'T FORGET IT.  
Guaranteed to do Double the Work of any other or Money Refunded.

SEND FOR CIRCULARS,  
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Engines, Boilers, Stamp Mills and Mining Machinery.

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Challenge Rock Breakers.  
Patented Nov. 18, 1879.

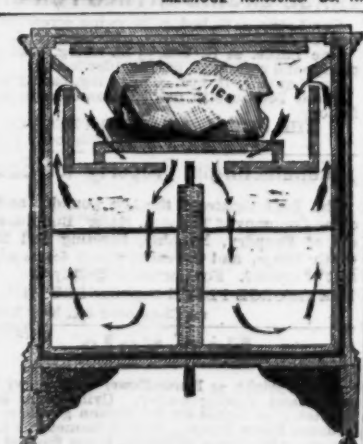
See *The Iron Age* first issue of the month.

## Grant Fan Mill & Cradle Co.

Manufacturers of  
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TURKEY WING GRAIN CRADLES,  
4, 5 and 6 fingers.  
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4 fingers.  
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All of a superior quality.  
None genuine unless marked  
Grant Fan Mill and Cradle Co.  
Send for illustrated catalogue  
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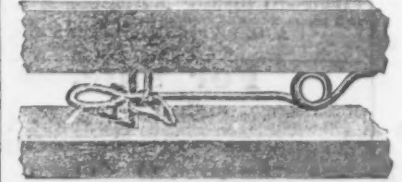
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Send for Illustrated Catalogue.

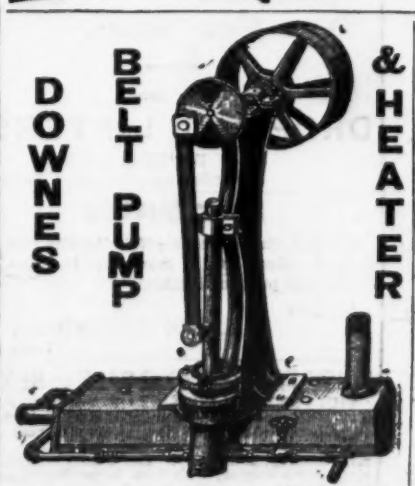
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**SHEDD'S STEEL SPRING WIRE**  
**Blind Fast.**

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A large assortment constantly on hand of Horizontal, Vertical and Locomotive Tubular Boilers from 3 to 60 H. P. and larger to order. Engines all sizes. Pumps, Steam and Hand Bricks and Mortar Hoists, Lathe Drills, Milling Machines, Boiler Test Pumps, &c.

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Correspondence solicited.

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The Cheapest and Best. Price, \$12.

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The best Key Ring in the market. Manufactured from the best steel and warranted not to break.  
**EVERY RING GUARANTEED.**

Manufactured exclusively by  
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For Bars, Plates, Sheets & Rods of Double Extra Quality Iron.  
NONE BUT CHOICEST MATERIAL USED.

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Wholesale Hardware Auctioneers.

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Sales held weekly for the trade. Consignments solicited. We refer to the leading manufacturers and importers.

**For Sale.**The Machinery, entire Furnaces, Tools, &c., of a Plate and Sheet Mill. Will be sold very cheap to responsible parties. Terms, one-third cash; balance partial payments, and long time.  
Address  
T. R. McKILLIP,  
74 Washington Street, Chicago, Ill.**Machinery For Sale.**Hydraulic Presses and Pumps suitable for line and cotton seed oil.  
Round and Square Tanks.  
Horizontal Engines, 22 x 48, and 16 x 30.  
Portable Engine and Boiler, 12 horse.  
Two 500-gallon Cast-Iron Kettles.  
H. C. BRIGGS,  
494 Water St., New York.**For Sale.**

Presses, Dies and Tools for Fruit Cans, Tinners, &amp;c. Address NIAGARA STAMPING &amp; TOOL CO., Buffalo, N. Y.

**Wanted.**A first-class Mechanical Editor, at once, for the *Cleveland Trade Review and Western Mechanist*. When writing please state what experience and paper last connected with, and what salary expected. Also give references.  
Address  
R. S. EVANS,  
Manager.**BLOOMS AND MILL BARS,**Made of charcoal iron, and specially suited for manufacture of sheets, may be shipped from any port on Baltic Sea. Apply to  
Z. E. 3144, Care Rudolf Mosse,  
Berlin, S. W., Germany**Wanted Immediately.**Three first-class spike cutters to work on Belknap Machines.  
SOUTH TREDEGAR IRON CO.,  
Chattanooga, Tenn.FOR SALE—Immediate delivery, the following second-hand steam hammers in first-class order.  
One 2000 lb. by Wm. Sellers & Co.  
One 1000 lb. by Wm. Sellers & Co.  
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Representing The Long & Allistetter Co., Purchasing and Shearing Machinery; Morgan, Williams & Co., Steam Hammers, in connection with a general line of first-class machine tools.  
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22 South 6th St., Philadelphia.**Wanted.**A practical machinist to run a foundry and planing mill by water power, at Huntsville, Cumberland County, Pa. Special inducements to a man with \$2000 to \$5000 of capital to invest in the business. Address  
DAVID LEFEVER,  
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JOHN KEPPelman,  
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Address  
P. O. BOX 802,  
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Address J. G. A.  
Office of *The Iron Age*, 220 S. 4th St., Phila., Pa.**Wanted.**Thoroughly competent Merchant Roller for 16 and 18-inch Trains. Apply to  
TOOKE STRAKER, Manager,  
Bounton Rolling Mills,  
Bounton, N. J.WANTED.—A position as Hammerman, by a man experienced in all kinds of Locomotive, Marine and General Forging in Steel.  
P. TINDLE,  
4435 Lackawanna St.,  
Frankford, Philadelphia, Pa.**Wanted.**A Partner with \$5000 to \$10,000 in a Foundry and Machine Business, established in 1824. For particulars, inquire of  
I. H. COLLIER,  
Poughkeepsie, N. Y.**Wanted.**All manufacturers to know that the HOLT MANUFACTURING CO., of Cleveland, Ohio, will, on and after April 1, sell the celebrated HOLT PORTABLE FORGES from \$10 upward. After thirteen years' experience in the Forge business, they think best to discontinue the agent system and sell direct to consumer. Write for circular of particulars and photographs of machines.  
Address HOLT MANUFACTURING CO.,  
Cleveland, Ohio.DRILL PRESS FOR SALE.—A new Upright Power Drill Press, swings 22 inches, back geared, quick return motion, steel spindle and shaft, superior finish; weight, 1100; height, 6 feet; price, \$210.  
FEELLESS PUNCH AND SHEAR CO.,  
115 W. Liberty St., New York.

A SITUATION WANTED AS HARDWARE A CLERK, &amp;c. Address O. L. E., Care D. C. Lane, 75 Broad St., New York.

A MAN of twenty-six, fully competent, desires a situation in the Hardware trade. Would travel. Have had full charge of a large retail store, and am a worker.  
IRVIN BESSE,  
Peabody, Mass.

## Special Notices.

**NEW IRON WORKING MACHINERY.**ENGINE LATHES.  
Two 24 in. swing, triple-gear (bed made to suit) Fitchburg June delivery.  
One 20 in. swing x 14 ft. bed. Fitchburg. April del.  
One 20 in. swing x 14 ft. bed. Blaisdell. May del.  
One 21 in. swing, x 14 ft. bed. Blaisdell. May del.  
Two 18 in. swing, x 12 or 14 ft. bed. Gray. April del.  
Two 18 in. x 12 ft. bed. Blair. On hand.  
Two 18 in. x 8 ft. bed Fitchburg. June delivery.PLANERS.  
One 36 in. x 36 in. x 11 ft. Wiles. On hand.  
One 24 in. x 24 in. x 10 ft. Fitchburg. On hand.  
One 20 in. x 20 in. x 10 ft. Hawes & Phillips. On hand.  
One 20 in. x 20 in. x 6 ft. (English make). On hand.  
One 20 x 30 x 8 ft. Fitchburg. On hand.  
One 18 x 18 x 4 ft. Gould. On hand.  
One 12 in. stroke shaper. Fitchburg. On hand.  
Two 10 in. stroke shaper. Fitchburg. On hand.DRILL PRESSES.  
One 60 in. radial drill (extra heavy) double-gear, self-feed, radial arm raises and lowers by power, planed and slotted bed plate with portable table. First-class English make. Weight, 4 tons. April delivery.  
One 24 in. radial drill, self-feed, double gearing and slotted and planed bed. Betts Machine Co. On hand.  
Two 20 in. swing, back-gear. Prentice. May del.  
Two 25 in. swing, back-gear. Fitchburg. On hand.  
Three 18 in. swing. Fitchburg. On hand.

KELLY &amp; LUDWIG, 49 &amp; 51 N. 7 St., Philadelphia, Pa.

**For Sale.****Palo Alto Rolling Mills,**  
Near Pottsville, Pa.,  
ON THE MAIN LINE OF THE POTTSVILLE AND READING RAILROAD.These mills are in good repair, and can be started in two days' time.  
Rolls for T-Rails 12 to 30 lbs. per yard, and for Street Rails 18 to 30 lbs. per yard.  
Guide Mill Train for Merchant Iron 3/4 to 1 inch.  
Rolls for Merchant Bar, round and square, up to 4 1/2 inches.Number of Puddling Furnaces in both mills, 30; Heating Furnaces, 2; all with boilers attached. Also Foundry, Machine Shop, Blacksmith Shops, Iron House, Roll House, Carpenter and Pattern Shops, Stables, handsome Dwelling for Superintendent, 11 Tenement Houses, a Brick Office, and ample grounds for stock and rider.  
For further particulars address  
Messrs. LEE & McCAMANT, Extrs.,  
Pottsville, Pa.THOS. F. WRIGHT, 184 Race St., Philadelphia, Pa.  
HUGH W. ADAMS, 36 Pine St., New York.**Machinery For Sale.** (ALL NEW).  
One 20-in. Power Drill Press. Three 20-in. Davis Power Drill Presses. Six Hand Blacksmith Drills. Three Gear Cutting Attachments for Lathes. Twelve Assorted Chucks, 4 in. to 18 in. One Bolt Cutter, 14 in. to 16 in. Three Barnes Lathes. Six Hand Shearing and Punching Machines. Two Sturtevant Bolvers. Also, one second-hand Horizontal Engine, 10 x 16.  
JACKSON & TYLER,  
14 and 18 S. Howard St., Baltimore.**For Sale.**One pair good, sound CHILLED ROLLS, 25 in. x 50 in., made by A. Garrison & Co., Pittsburgh. No use for them.  
Also a HEATER, 18 in. x 60 in., with 21 3-inch tubes. Been used some. Will sell cheap.  
CHAS. HUSTON & SONS,  
Colesville, Chester County, Pa.**For Sale.**One Burdick Header, Small Forged Bolts, second-hand.  
Two Lowell Forged Headers.  
One Heavy Tire Blank Upsetter, very strong, Chapin Maker; Head 3/4 x 6 in., open dies.  
One Double Punch and Shears, Allistetter No. 7, second-hand.  
One Geared Cam Press, Table 24 x 18 in., used for cutting out Paper Collars.  
Two Key Seal Cutters, Screw and Nut Feed.  
One Double-Bolt Cutter, Smith maker, little used.  
Also our full line of National Machinery Co.'s manufactures: Hot-pressed and Hot-forged Nut Machines; Bolt Cutters, National Head, 8 sizes; Double-Bolt Cutters, Tappers, Headers, Washers, Rivet, Track Bolt, Pointers, Burers, and full outfit for Bolt and Nut manufactures. Address NATIONAL MACHINERY CO., Cleveland, Ohio, the only Specialists in the United States.**For Sale.**Second-hand  
DROPS AND LIFTERS.  
BEECHER & PECK,  
Lock Box 122, New Haven, Conn.**For Sale.**One B. F. Sturtevant No. 7 Noiseless Fan Blower, in good order; used a short time for blowing heating and puddling furnaces.  
Apply to  
YORK ROLLING MILLS,  
York, Pa.**BRICK FACTORY FOR SALE OR RENT.**THE PREMISES CONSIST OF A BRICK FACTORY, a Storehouse, a Packing Building and Office, with about two acres of land, located a short distance from the post office, railroad depots, and river landing, in this city. The factory contains a sixty-horse engine, with two large live boilers, with heating steam heated, and covered with iron. The property can be had on the most favorable terms. Apply to  
GEO. N. WARD,  
Middletown, Conn., April, 1882.**For Sale.**A Hardware and General Housefurnishing Store, situated in a lively mining town in Pennsylvania, and doing a good and safe business. Stock running from \$12,000 to \$15,000; sales over \$40,000; only hardware store in the place; reason for selling, going away. Address for further information, BOX F,  
Office of *The Iron Age*, 83 Reade St., New York.**Car Works for Sale.**Present output about five cars daily. Either a personal interview, or full particulars may be obtained, by addressing the owner, X. Y. Z.,  
Office of *The Iron Age*, 83 Reade St., New York.**For Sale.**Two Corliss Condensing Beam Engines,  
32 in. x 72 in. cylinders. Address,  
THE HARTFORD ENGINEERING CO.,  
Hartford, Conn.WANTED.—A young man wants a position in a first-class Hardware establishment as a Traveling Salesman, with ten years' experience in the General Hardware business, and has some experience on the road. Best of reference.  
Address  
P. O. BOX 23, Lewistown, Pa.

## Special Notices.

**Second Hand and New MACHINERY.**

MARCH 29, 1882.

One Car Axle Lathe, Hewes & Phillips. New.  
One Engine Lathe, 26 in. x 10 ft. A1 order.  
One Engine Lathe, 26 in. x 10 ft. Fitchburg. New.  
One Engine Lathe, 24 in. x 10 ft. Fitchburg. New.  
One Engine Lathe, 22 in. x 10 ft. New Haven. New.  
One Engine Lathe, 20 in. x 12 ft. Ames. New.  
One Engine Lathe, 20 in. x 8 ft. Ames. New.  
Three Engine Lathes, 18 in. x 8 ft. Jones & Lamson.Two Engine Lathes, 18 in. x 7 ft. Good order.  
One Engine Lathe, 16 in. x 7 ft. Bridgeport Mch. Tool Works.  
Six Engine Lathes, 16 in. x 6 ft. 7 ft. x 8 ft. Ames. New.  
One Engine Lathe, 14 in. x 6 ft. Fitchburg. New.  
One Engine Lathe, 14 in. x 6 ft. Fitchburg. New.  
Two Engine Lathes, 14 in. x 6 ft. Star Tool Co. New.  
One Engine Lathe, 12 in. x 6 ft. Fitchburg. New.  
Two Planers, 11 in. x 3 ft. Good order.  
One Planer, 17 1/2 in. x 3 1/2 ft. Good order.  
One Planer, 24 in. x 5 ft. Ames. New.  
One Planer, 26 in. x 6 ft. Hendey. New.  
One Planer, 26 in. x 6 ft. Fitchburg. New.  
One Planer, 24 in. x 5 ft. New Haven. Good order.  
One Planer, 24 in. x 5 ft. Whitcomb. Good order.One 6 in. Stroke Shaper. Boynton. New.  
One 12 in. Stroke Shaper. Hendey. New.  
One 14 in. Stroke Shaper. Hendey. New.  
One 14 in. Stroke Shaper. O. B. New.  
One 20 in. Upright Drill. Prentice. New.  
One 24 in. Upright Drill. New Haven. New.  
One 28 in. Upright Drill. Kidd. Good order.  
Three Sensitive. Lincoln Millers and Vises. Good order.  
One No. 3 Garvin Hand Mill. New.  
One 1 1/2 lb. Air Hammer. Hotchkiss. Good order.  
One 200 lb. Bradley Hammer. A1.**For Sale.**E. P. BULLARD, 14 Day St., New York,  
GENERAL EASTERN AGENT FOR  
Akron Iron Co.'s Patent Hot Polished Shafting.**FOR SALE OR TO RENT.**New, light Factory; 70,000 floor feet; 275 H. P. Corliss Engine, giving power at minimum cost.  
Shafting, piping, elevator, &c., all complete and modern. Lowest insurance rates. Railroad siding and ample yard room. Immediate possession.  
A large quantity of General and Special Machinery at low prices.  
SHARPE RIFLE COMPANY,  
Bridgeport, Conn.**For Sale.**A Hardware Manufactory, at Westville, Conn., consisting of Foundry, Machine Shop, Storehouse and other buildings; also Water Power. Good location. Address  
THE BLAKE HARDWARE CO.,  
New Haven, Conn.**For Sale.**Horizontal Engines, 18 x 30 inch, slide valve; also 16 x 41 (Hewes & Phillips), with cut-off; 16 x 36 (Carrier), with cut-off; 16 x 24 Upright Engine, with cut-off; one 20 H. P. Locomotive Boiler; one 4-ton "Otis" Freight Elevator; No. 5 Knowles Steam Pump. All the above guaranteed complete and in perfect order. For particulars address  
BELCHER & RAGLAND,  
40 Cortlandt St., N. Y.**For Sale.**Stock of hardware, stoves and implements, and store furniture, in one of the best towns in Kansas.  
Address  
HARDWARE,  
Box 566, Salina, Kansas.**LARGE ENGINE LATHES FOR SALE.**One Lathe, 12 ft. bed, 24 in. swing, screw cutting, triple gear, compound rest, with cross-feed.  
One Lathe, 20 ft. bed, 35 in. swing, back gear, compound rest, cross and angular feed.  
One Lathe, 10 ft. bed, 50 in. swing, back geared. These Tools are in use, and can be seen at our factory.  
THE STILES & PARKER PRESS CO.,  
Middletown, Conn.**Manufacturing Property for Sale.**The Real Estate of the late Foundry and Machine Company of Taunton, Mass. Buildings consist of Foundry, Machine, Erecting and Blacksmith Shops, and covering about 60,000 square feet of ground. For particulars apply to  
THE GEORGE PLACE MACHINERY AGENCY,  
121 Chambers St., New York.**For Sale.**

One Upright 35 Horse-Power Engine, with fly-wheel and driving pulley. Cylinder 30 inches diameter, 30 inches stroke, Judson governor, and Plunger Force Pump, 4 inches diameter, 8 inches stroke, with brass plungers, brass hand and valves. Price \$500 on board cars at Buffalo Iron and Nail Co.'s Rolling Mills in Buffalo, N. Y.

One Fly-Wheel, 7 feet in diameter, run 8 inches by 9 inches, with belt pulley 4 feet diameter, 19 1/2 inch face, double arms, all keyed on to wrought-iron shaft 5 inches diameter, 6 1/2 feet long. Price 3 cents per pound, net. Apply to  
F. L. PRATT, Buffalo, N. Y.**For Sale.**One Horizontal Slide Valve Engine, 13 in. x 28 in., 60 H. P. New.  
One Horizontal Slide Valve Engine, 8 in. x 24 in., 30 H. P. Nearly New.  
One Horizontal Slide Valve Engine, 8 in. x 24 in., 30 H. P. Second Hand.  
One Baxter Engine and Boiler, 10 H. P. Second Hand.  
For further particulars address  
ORANGE CO. FURNACE, Middletown, N. Y.**For Sale.**Nine inch Merchant Mill and 56 Rolls. Lever Shears for cutting railroad iron. Lever Shears for cutting 1/2 inch x 2 inch. Lever Shears for cutting 3/4-inch plate.  
Nutmeg, with brass plungers, brass hand and valves. Price \$500 on board cars at Buffalo Iron and Nail Co.'s Rolling Mills in Buffalo, N. Y.Horizontal Engines, 10 x 16, 10 x 18, 11 x 20, 12 x 20, 14 x 20 and boilers to suit.  
A. G. BROOKS & WINEBRENER,  
261 North 3d St., Philadelphia.**For Sale.**A well-established, growing Hardware and Stove business at Hot Springs, Ark. Clean stock.  
Address  
LOCK BOX 415,  
Little Rock, Ark.

## Special Notices.

**Second-hand and New MACHINERY.**

IN STORE, MARCH 29.

One Screw Planer, 70 in. x 11 ft.  
One Screw Planer, 34 in. x 14 ft.  
One Planer, 28 in. x 5 ft. Core Mach. Co.  
One Lathe, 22 in. x 12 ft. New.  
One Lathe, 18 in. x 8 ft. New.  
One Lathe, 17 in. x 10 ft. Lincoln.  
One Lathe, 16 in. x 6 ft. Blaisdell.  
One Lathe, 16 in. x 6 ft. Wood & Light.  
One Crank Planer, 12 in. stroke.  
One Milling Machine, No. 4. Wood & Light.  
One large Index Milling Machine.  
One Storer Shaper, 8 in. stroke.  
One 36 in. Daniels Planing Machine.  
One Burleigh Rock Drill, No. 4.  
One Woodward Pump, No. 4.  
One Woodward Pump, No. 5.  
One Knowles Pump, No. 7. Special.  
One Cameron Pump, No. 2. Special.  
One Bliss & Williams Foot Press.  
One pair Paper Rolls.  
One Pipe Cutting Machine.  
One Corliss Beam Condensing Engine, 30 in. x 72 in.  
One Oscillating Engine, 15 in. x 10 in.  
One Horizontal Engine, 11 in. x 24 in.  
One Horizontal Engine, 8 in. x 10 in.  
Two Horizontal Engines, 6 in. x 8 in. New.  
One Horizontal Engine, 3 in. x 6 in.  
One H. P. Baxter Engine.  
One Portable Engine, 8 in. x 12 in.  
One Portable Engine, 8 in. x 10 in.  
One Locomotive Steel Boiler, 25 H. P.  
Two Locomotive Boilers, 100 H. P.  
One Locomotive Fuel Boiler, 4 ft. x 22 ft. Shafting, Pulleys and Hangers.  
Fairbanks Scales.

J. Gray's Machinery Depot, 37 Day St., N. Y.

**TO MANUFACTURERS AND CAPITALISTS.**

Manufacturers contemplating a change of location, or capitalists desiring to engage in manufacturing, are respectfully advised that the City of Piqua owns a large, simple, and is desirous to dispose of the same on liberal terms, a valuable tract of land with extensive Brick Buildings, Sheds, Dwelling House, Office Building, together with the boiler, Engine and Line Shafting, &amp;c.

With a view to encourage manufacturing in our midst, the City will offer unusually liberal inducements to any party or parties who will employ a reasonable number of hands. The buildings were constructed in 1872 for Car Works, and are situated along the Pittsburgh, Cincinnati &amp; St. Louis Railway with side tracks running through the grounds. The City has the best water works in Ohio, and a Hydraulic Canal furnishing power for manufacturing purposes to almost any extent.

The following branches of industry are now represented here, and are all in a flourishing condition: 3 Lined Oil Mills, 2 Flouring Mills, 2 Handicrafts 2 Furniture Factories, 2 Agricultural Implement Works, 2 Straw Board and Paper Mills, 1 Paper Mill, 1 Wood Mill, 1 Bent Wood Works, 1 Wagon Works, 1 Machine and Engine Works, 2 Flax Straw Mills, 1 Mill House, besides a number of minor enterprises.

Correspondence is respectfully solicited, and any further information desired will be cheerfully furnished. Persons looking for location are invited to come here and make a personal inspection of the premises and learn further particulars. All communications should be addressed to  
HENRY FLESH,  
President of the City Council, Piqua, Ohio.**For Sale.**The Industrial Works of Shamokin, owned and successfully carried on for a number of years by the late Wm. Brown, deceased, consisting of Foundry and Machine Shop, and a large stock of Patterns regarded as part of the property. Boiler Shop, Blacksmith Shop and Factory for the manufacture of heavy coal screens. Well located in the borough of Shamokin, Pa., with the best facilities for shipping by rail, and surrounded by a district contributing all the work that a shop of that kind can possibly turn out. The works are now running, but in a very short time possession can be given. Easy terms of payment are offered to suit a purchaser of limited capital.  
Offered for sale by  
WM. MOILVAIN & SONS,  
Reading, Pa.**For Sale.**The largest stock of New and Second-hand Engines, Boilers, and general Machinery in the West. Send for Catalogue. Hoisting Outfits for Coal Mining and other purposes a specialty.  
WARREN SPRINGER,  
195 to 219 South Canal St., Chicago.**FOR SALE LOW.—ENGINE.**A Vertical High-Pressure Steam Engine, complete. Cylinder, 24 in. by 48 in. Built by A. J. Sweeney & Son. Can be seen in daily use at our mill factory.  
LA BELLE IRON WORKS,  
Wheeling, West Va.**DESIRABLE MANUFACTURING SITE****For Sale or Rent.**  
Being the extensive property formerly occupied by the  
BUFFALO IRON AND NAIL WORKS AT BLACK ROCK, IN THIS CITY.The buildings cover over three acres, and are of brick and wood, substantially constructed, and with slate roofs. They could easily be changed, if necessary, to almost any kind of business. Water and railroad communication to all parts of the country.  
Maps of the property, with full description, sent on application.  
P. P. PRATT or F. L. PRATT,  
Buffalo, N. Y.**For Sale.**Two Traveling Cranes, 20-ton capacity. Also, 28-inch Lathes, Patterns, 18 feet bed. A lot of Lathe Chucks from 18 inch to 28 inch, new; all the New York Steam Engine Co.'s make. Also Iron Hanger Patterns from 1 inch to 4 inch, complete.  
JOSKEPH LUMLEY,  
144 N. 3d St., Philadelphia, Pa.**Presses for Sale.**Three small Power Punching Presses, in first-class order. They have heavy fly wheels; two are 13 in. diam., and one 16 in. Price \$65 each (cost \$150). Also two large new Punching Presses; weight, 1200 each; box frame style; height, 5 feet; throat, 6 inches; opening in bed, 3 x 3; balance wheel, 30 x 36, weighing about 300 pounds.  
FEELLESS PUNCH AND SHEAR CO.,  
115 W. Liberty St., New York.**Situation Wanted**By a man, aged 32, of several years' experience in all the details of a Merchant-Bar and Sheet Mill, as Assistant Manager, Stockholder, Time-keeper or shipper. Good references. Five years in last situation. Apply to  
C. F.,  
P. O. Box 203, Acadia Iron Mine,  
Londonderry, Nova Scotia.

## Special Notices.

**JOB LOT.**  
ELEY BROTHERS'**GENUINE BLUE CARTRIDGE CASES,**  
Twelve Gauge.  
The best paper shell in the market. For sale cheap. Supply limited.ALFRED FIELD & CO.,  
93 Chambers St., N. Y.**Notice to Manufacturers of CAST-IRON WATER PIPE.**Sealed proposals will be received at the office of the Board of Water Commissioners, City Hall, Hoboken, N. J., until 8 o'clock p. m. Thursday, April 27, 1882, for furnishing the following Cast-Iron Water Pipe and the necessary Castings:  
Four thousand three hundred and fifty (4350) feet of sixteen (16) inch.  
Two thousand seven hundred (2700) feet of twelve (12) inch, and the required Branches, Bends, &c. To be made of a good quality of iron. The pipes to be cast vertically, bell-end down; tested and inspected under a hydraulic pressure of three hundred (300) pounds to the square inch. To be free from defects of all description; to be coated with tar while hot inside and out. The pipes to weigh on an average as follows: The sixteen inch, one hundred and twenty-five (125) pounds to the lineal foot; the twelve inch, seventy-five (75) pounds to the lineal foot. The Branches and Castings to be of corresponding strength. The Hub or Socket and the Spigot end of the pipes will be shaped in exact conformity with the drawings which will be furnished. Proposals to be indorsed: Proposals for furnishing Cast-Iron Water Pipe, and directed to the Board of Water Commissioners of the City of Hoboken. The Board reserve the right to reject any or all bids if deemed for the interests of the city so to do.  
M. H. MURPHY, Registrar.**To Railroads, Mill Owners and Contractors.****STRUCTURAL IRON WORK FOR SALE.**  
Having purchased the Ironwork of the Main Centennial Building, situated in Fairmount Park, Philadelphia, we now offer the same in sections to suit purchasers. These buildings can be sold in widths varying from 20 to 25 feet, and of any height, from 40 feet down to 35 feet, and in length from 100 to 500 feet. We have eight Spiral Stairways, in all over 500 steps.  
Plans showing how all parts of these buildings may be utilized in railroad depots, &c., have been prepared by Messrs. Wilson Bros. & Co., of Philadelphia, civil engineers and architects, and can be seen at the office of Mackintosh, Hemphill & Co., Limited, Fort Pitt Foundry, Pittsburgh, Pa., or at the office of the company, at Centennial Building, West Philadelphia.

Wishing to dispose of the above quickly, we are prepared to offer great inducements to purchasers, both as to low price of material and promptness of delivery. Any communications addressed to the CENTENNIAL STRUCTURAL CO., care of Mackintosh, Hemphill &amp; Co., Limited, will receive prompt attention.

THE NEW ENGLAND

**Manufacturers & Mechanics' Institute**will hold their Second Annual Exhibition a Boston, in their specially constructed Exhibition Building, the largest in the United States, during SEPTEMBER AND OCTOBER, 1882.  
Exhibitors invited from the whole world. Blank forms of applications for space sent upon application to  
JOHN F. WOOD, Treasurer,  
38 Hawley Street, Boston, Mass.**Copartnership Dissolution.**NOTICE is hereby given that by the death of the junior partner, Mr. Nathan Anthony, the firm of BRADFORD & ANTHONY is this day dissolved. The affairs of the firm will be settled by the undersigned, the sole surviving partner.  
MARTIN L. BRADFORD.  
Boston, June 12, 1882.  
All communications in regard to the affairs of the late firm should be addressed to  
BRADFORD & ANTHONY, Boston, Mass.**For Sale.**MARTIN L. BRADFORD hereby gives notice that he will continue his business under the name of "BRADFORD & ANTHONY."  
The estate of the late Nathan Anthony is to be in no way interested in the future business whether conducted under the name of Bradford & Anthony or otherwise.  
All business communications should be addressed to  
BRADFORD & ANTHONY,  
174 Washington St., Boston.  
Importers, Manufacturers' Agents and Dealers in Cutlery, Fishing Tackle, Skates.  
See advertisement first issue each month.**The Sherman Process Co.**9 Pemberton Square, Boston, Mass.,  
Issue Licenses to use the Process for the Manufacture of Iron and Steel  
In the Bessemer Converter, Crucible, Siemens-Martin, Puddling, Blast and Cupola Furnaces.  
The use of this Process improves the quality of the product, saves fuel and labor, and does not require any change in furnace or manner of working. See page 17 of *The Iron Age* of Oct. 25th, 1877.**To Manufacturers or Capitalists.**Water Power, with Factory, Foundry and other buildings in the state of Connecticut, all in fine working order and all now occupied. Will be sold to close a copartnership.  
This is a rare opportunity, as water power is never falling. For further particulars inquire of  
F. B. GURNEY,  
No. 95 Chambers Street, N. Y.**Notice.**

A building site will be given to responsible parties who understand the business, and will erect Car Wheel, Malleable or other Iron Works in thriving village.



# Trade Report.

## BRITISH IRON AND METAL MARKETS.

[Special Cable Dispatch to The Iron Age.]

LONDON, WEDNESDAY, April 26, 1882.

**Scotch Pig.**—A considerable business has been done during the week, at irregular prices. Values continue to fall off, our quotations showing a decline of 1/ in Langloan, Coltness and Gartsherrie, and 6d. in Summerlee and Eglinton. The following are to-day's prices for No. 1:

Langloan, alongside, Glasgow.....	39/
Coltness " " " " " " " " " "	38/6
Gartsherrie " " " " " " " " " "	38/6
Summerlee " " " " " " " " " "	37/6
Carnbroe " " " " " " " " " "	37/6
Glenarnock " " " " " " " " " "	37/6
Eglinton " " " " " " " " " "	37/6
Lighterage from Ardrossan to Glasgow is 2/ @ 2/6 per ton.	

**Cleveland Pig.**—The market is very unsettled, and makers' prices are difficult to quote. No. 3 G. M. B. is quoted 42/3 @ 43/6, f. o. b. makers' wharves in Tees. The following quotations are as near as can be given in the present state of the market.

Middlesbrough No. 1 Foundry.....	46/
" " " " " " " " " "	44/6
" " " " " " " " " "	44/3 @ 43/6
" " " " " " " " " "	43/6

**Bessemer Pig.**—Considerable inquiry is reported, but actual transactions have been only fair. We quote W. C. Hematites, equal portions Nos. 1, 2 and 3, nominally, 53/ @ 54/.

**Blooms.**—The market is dull, with small demand and little business. We hear of 1400 tons Bolckows, for Philadelphia account, and inquiries for 1000 tons for San Francisco.

**Manufactured Iron.**—The market is quiet, with but little demand, and prices are nominally as follows:

Staff. Ord. Marked Bars.....	7 0 @ 7 10
" " " " " " " " " "	7 0 @ 7 10
" " " " " " " " " "	6 0 @ 6 10

**Hoops.**—W. G. & over.

" Common Best.....	8 0 @ 8 10
" " " " " " " " " "	7 0 @ 7 10
" " " " " " " " " "	6 10 @ 6 15

**Sheets.**—W. G. & under.

" Ordinary Best.....	8 10 @ 9 0
" " " " " " " " " "	8 0 @ 8 10
" " " " " " " " " "	7 10 @ 8 0

**Steel Rails.**—The demand is light and transactions small. We hear of inquiries for Steel Rails for San Francisco. Ordinary sections are quoted, nominally, £5. 12/6 @ £5. 17/6.

**Iron Rails.**—There is very little business doing, and quotations are nominal. We quote Welsh, 30-lb and upward, nominally, £5. 5/ f. o. b. shipping ports.

**Old Rails.**—The offerings are light, and prices are tending downward. There are no sales to report. Old D. H.'s are quoted 87/6 at Philadelphia.

**Scrap.**—The market is dull, with moderate offerings. No sales are reported. Prices are weak. We quote Heavy Wrought, nominally, c. i. f. New York, £4.

**Copper.**—During the week the market has been depressed, but has now recovered a little, though still very far from being strong. Best selected is quoted £70 @ £71, and Chili Bars, £63. 15/ @ £64. 5/.

**Tin.**—The downward tendency of prices received a check during the week, and prices advanced a little, but have fallen off again, and are now weak. Straits Ingot, spot, is quoted £96 @ £96. 15/.

**Tin Plates.**—The market is unsettled, and quotations are nominal:

Tin Plates, 10 x 14, 1st qual. Charcoal.....	21/ @ 24/
" " " " " " " " " "	18/ @ 20/
" " " " " " " " " "	17/ @ 19/
" " " " " " " " " "	16/ @ 18/

**Spelter.**—The market is dull, and prices are weak. We quote Ordinary, at shipping ports, nominally, £16. 17/6 @ £17.

**Lead.**—There is but little demand, and the tendency of prices is in buyers' favor. Common English Pig is quoted £14. 10/ @ £14. 17/6.

**Freights.**—Steam from Glasgow to New York, 9/6 @ 10/; Liverpool to New York, 10/ @ 11/; and Liverpool to Philadelphia, 10/6 @ 11/.

## FINANCIAL.

Office of THE IRON AGE, 1  
WEDNESDAY EVENING, April 26, 1882.

General trade has been sluggish throughout the week. In fact, the spring business from the start has been hardly up to expectations, attributable, in many departments, to the open winter and exceptionally bad roads, especially in the West and Northwest. The influence of the disastrous floods in river bottoms is also perceptible in limiting the demands of purchasers. At the same time a very hopeful feeling exists, arising from good crop prospects both West and South, and the generally healthful condition of trade as regards credits, there being few signs of undue expansion, such as might excite fears of commercial revulsion. Moreover, there is a superabundance of money, so that our savings banks and other fiscal institutions are encumbered with large blocks of cash, which are offered in some instances for a term of years as low as 4%, or even 4%. The enormous influx of immigration, too, has a buoying tendency. The outlook, therefore, financially and commercially, may be regarded as auspicious, despite the cloud resting upon the foreign trade, in the present

unfavorable disproportion of exports and imports and derangement caused by speculation in agricultural products.

On the Stock Exchange, during the week under review there has been some improvement, the bear element having been less demonstrative. A partial recovery in prices became more manifest in consequence of attempts to cover short contracts. On Thursday the Wabashes became very weak, unsettling the whole list, and on Friday there was a sharp attack on New Jersey Central, which was renewed on Monday and Tuesday, based on reports that the road was burdened by a floating debt of \$2,500,000, and would soon be taken out of the hands of the receiver. Stocks, in fact, form simply "a traders' market," with few signs of a speedy change. To-day the market was irregular. The principal dealings were in Lake Shore at 103 3/4 @ 102 1/2, Denver at 61 1/4 @ 59 3/4, Jersey Central, 68 3/4 @ 67 1/4; D. L. & W., 118 3/4 @ 117 3/4, and Missouri Pacific, 88 3/4 @ 87 3/4.

Foreign exchange during most of the week was quiet, but firm. Considerable exchange was made against the export of railroad bonds and other securities. The actual rates are 4.86 1/2 @ 1/4 and 4.89 1/4 @ 1/2. Government bonds are strong, with heavy sales on foreign account. The closing quotations to-day were as follows:

	Bid.	Asked.
U. S. 6's, '81, continued at 3 1/4.....	101 3/4	102 1/4
U. S. 5's, '81, continued at 3 1/4.....	102 1/4	103 1/4
U. S. 4's, '81, registered.....	116 1/4	117 1/4
U. S. 4's, '81, coupon.....	116 1/4	117 1/4
U. S. 4's, '81, registered.....	116 1/4	117 1/4
U. S. 4's, '81, coupon.....	116 1/4	117 1/4
U. S. Currency 6's 1897.....	113 1/4	114 1/4
U. S. Currency 6's 1897.....	113 1/4	114 1/4
U. S. Currency 6's 1897.....	113 1/4	114 1/4
U. S. Currency 6's 1897.....	113 1/4	114 1/4

A Washington dispatch states that a call for \$15,000,000 extended 6's will be issued May 3, which will leave less than \$45,000,000 of those bonds outstanding, and it is expected that they will all be practically retired by August.

State stocks have been strong and occasionally active. To-day Tennessee 6's advanced to 59 1/2, while Alabama, Class A, declined to 51 1/4 and Louisiana Consols to 65.

The exports of domestic produce from this port during the past week were below the usual average, the total being but \$6,006,121, against \$6,532,692 for the same week last year. The shipments of petroleum were fair, but the movement of the other principal articles, such as breadstuffs, provisions, &c., was light. Since January 1 the value of merchandise imported is \$30,380,471 greater than for the corresponding time in 1881, while the value of the merchandise exported is \$21,052,941 less. For the corresponding date last year the imports exceeded the exports only \$12,067,804; this year the imports exceed the exports \$64,400,786.

It is said that Mr. Houston will retire from the presidency of the Pacific Mail Company at the coming election, and be succeeded by Mr. Gould and associates in the Board of Directors.

The importations of specie and bullion at this port during the week ending April 21 were \$32,000, consisting of \$10,450 in gold, and \$21,460 in silver, as against a total of \$2,764,081 for the week ending April 23 last year. The importations since the 1st of January and since the 1st of August compare as follows with the movement during the corresponding periods last year:

	Since January 1.	Since August 1.
Gold.....	\$1,145,610	\$2,374,375
Silver.....	\$1,145,610	\$2,374,375
Total.....	\$2,291,220	\$4,748,750

The bank returns for the week shows a gain of \$4,093,400 in reserve, which now stands at \$9,049,550 above, against \$8,059,150 above at this time last year, and \$2,191,525 below for the corresponding date in 1880.

The following is an analysis of the bank totals of this week compared with that of last week:

	April 15.	April 22.	Comparisons.
Loans.....	\$12,648,300	\$12,688,400	Dec. \$39,800
Specie.....	\$1,221,600	\$4,133,000	Inc. \$2,911,400
Legal tenders.....	\$1,221,600	\$1,221,600	Inc. \$0
Deposits.....	\$91,353,400	\$93,354,400	Inc. \$2,001,000
Circulation.....	\$0,007,000	\$0,366,800	Dec. \$359,800

## GENERAL HARDWARE.

We learn from Mr. Newhall, New York agent, that the works of the Providence Tool Company were started up again on Wednesday morning, and, as he remarked, "more vigorous than ever." The financial affairs of the company, as disclosed at a meeting of the creditors last Saturday, were less favorable than had been expected. As reported to Bradstreet's agency in this city, they were a surprise. The account stands about as follows: Assets, real estate, \$513,000; personal, \$133,700; merchandise, January 1, \$428,700; machinery, &c., \$1,327,400; sundry patents, \$55,602; the company's own stock, valued at \$91,400; Keat's Machine Company, \$91,700; personal accounts, including cash, \$36,700. Upon the foregoing it is remarked that the merchandise account is probably larger now, while the stock referred to is at present worthless. Liabilities, to New York agent: Debtor to balance, \$164,694; the company's notes used by him, \$167,613, leaving a balance against him of about \$3000. Due Chicago agent for advances on merchandise account, \$24,300; general accounts payable, \$104,062. The pay-roll is estimated at \$15,500. Notes payable, \$854,733, not including \$155,000 due

Drexel, Morgan & Co. upon guns in their hands which do not appear in the inventory, less any amount which may be realized from the sale of 48,167 rifles and 41,900 snubbers, bayonets and scabbards over and above advances, they being of the contract valuation of about \$800,000. The officers of the company, according to the reports made to creditors, state that there is a present demand for much of their surplus machinery. They invested considerably in Sewing Machines, in order to utilize their property. Their Hardware department is active. Their sales for March amounted to \$90,000. The pay-roll was \$30,000. They say that if they had dismissed the idea of doing more Gun work, and sold their Machinery and collateral Guns, they would undoubtedly be much better off. The creditors appointed an able committee to investigate the company's affairs, with discretion to use any of the assets or funds for the purpose of completing orders.

We have received the following card:

NEW YORK, April 26, 1882.  
GENTLEMEN: The works of the Providence Tool Company have been stopped for a few days, thus interfering slightly with deliveries of goods of their manufacture. Their factories are again in operation, and deliveries of merchandise of all kinds will be made without further interruption.

Yours respectfully,  
J. B. ANTHONY, President.

The demand for General Hardware has tapered off considerably, and we hear a good deal of complaint that the current business is a disappointment to the trade. The tone of the market continues strong, and no changes in values have been reported during the week.

The Eagle Lock Company have purchased the stock, property and business of the Western Lock Company, of Geneva, Ohio, and the removal of this competitor from the field has had a strengthening effect on the price of Cabinet Locks, which of late has been somewhat demoralized.

The demand for Nails, certainly as far as the local trade is concerned, is disappointing although we hear of a fair business on out-of-town account. There is no improvement to note in regard to a stricter adherence to the card rate, and \$3.30 per keg for 10d. to 6d. seems to be the ruling price for small or large orders.

The New York Smelting and Refining Co., in a circular to the trade under date of the 25th inst., say: "In consequence of the fire which occurred at our works last evening, we may have to ask a little indulgence from our customers on their orders for Solder, Babbitt and other Bar Metals for a few days, the fire having been confined to that part of our works. Our Spelter, Lead, Lead Pipe, Sheet Lead, Old and New Metal departments remain uninjured, and all orders for any of the above goods will be shipped without delay."

The Globe Nail Company have issued the following circular:

Boston, April 15, 1882.  
In notifying you of the death of T. H. Fuller, Esq., the late president and manager, we desire to state that the company has been reorganized with an ample working capital, and is now prepared to fill all orders promptly, and in a satisfactory manner.

We trust that you will favor us with your patronage as heretofore, and assure you that in the manufacture of our standard "Globe" Nails, we shall, by the use of the best stock that can be procured and the adoption of a liberal and equitable policy, endeavor to make our future business relations mutually pleasant and profitable.

ABETAS BLOOD, Pres't,  
J. T. BAILEY, Treas.,  
H. D. PARKER,  
JOHN T. COOLIDGE,  
EZRA H. BAKER,  
R. M. MORSE, Jr.

At the annual meeting of the stockholders of the Yale Lock Mfg. Co., held on April 20, the following gentlemen were re-elected directors for the ensuing year:

HENRY R. TOWNE, Stamford.  
SCHUYLER MERRITT, Stamford.  
GEORGE E. WHITE, Stamford.  
M. F. MERRITT, Stamford.  
ALBERT KELLEY, New York.  
BEAUVILLE BORIS, Philadelphia.  
THOS. F. KEATING, New York.

At a subsequent meeting of the directors, the following officers were re-elected, viz.: Henry R. Towne, president; Schuyler Merritt, secretary, and George E. White, treasurer.

Alex. M. Lesley, No. 1327 Broadway, has issued the following price list for the Zero Refrigerators for the season of 1882. The discount to the trade from this list is 25 per cent. In an advertisement of these goods, which appeared in our issue of the 20th inst., Mr. Lesley's street number was incorrectly printed 327 instead of 1327.

ZEISS REFRIGERATORS.  
Sizes and Prices.—Dimensions and Prices—Grained in Oak.

Number.	Length.	Depth.	Height.	Price.
1	30	18	30	\$8.00
2	30	18	30	\$8.00
3	30	18	30	\$8.00
4	30	18	30	\$8.00
5	30	18	30	\$8.00
6	30	18	30	\$8.00
7	30	18	30	\$8.00
8	30	18	30	\$8.00
9	30	18	30	\$8.00
10	30	18	30	\$8.00

W. & J. Tiebout, No. 33 Chambers street, have just issued a handsomely illustrated catalogue and price list of their specialties in Brass, Galvanized and Ship Chandlery Hardware. Among the goods illustrated we

notice a good line of heavy cast Brass Butt and other Hinges, Galvanized Wrought-Iron Strap and T and Plate Hinges, Cast Brass Bolts in various patterns, Brass Sash Pulleys, Window Catches, Hooks and Staples and kindred goods, Brass Ship Locks and Knobs, and a very complete assortment of Ship Chandlery Hardware. The book contains 147 pages, and is printed on heavy tinted paper with good clear type. The illustrations and binding are first-class.

The New York offices of Humason & Beckley Mfg. Co., the Wm. Rogers Mfg. Co. and Stephens & Co., will be moved from No. 100 to No. 83 Chambers street on the 1st proximo.

## IRON.

**American Pig.**—The tone of the market is unchanged since our last writing. As far as demand is concerned, there is little doing beyond filling small orders to tide over the requirements of the moment, and were it not for the fact that the leading furnaces on the Lehigh are well supplied with orders taken months ago, when the outlook was brighter than it is at present, the position would be decidedly gloomy. It is pleasant to note, however, that deliveries on contracts continue on the large scale so frequently noted in these columns, and the consumption of Iron is said to be as heavy as at any time during the last 12 months; another encouraging feature is that there is no evidence of any pressure to sell, and so far as domestic Pig Iron is concerned, values are well sustained. We quote Foundry No. 1 X, \$25 @ \$25.50; Foundry No. 2 X, \$24; Gray Forge, \$23.

**Scotch Pig.**—A good deal of Scotch P has been sold during the week, but terms of sale have been, as a rule, private, from which it may be inferred that prices lower than current quotations have been accepted. Included in the sales are 350 tons Glenarnock, in lots, at prices said to average about \$24. We quote: Eglinton, \$23; Carnbroe and Glenarnock, \$24; Gartsherrie, \$25 @ \$25.50; Coltness and Langloan, \$25.50 @ \$26.

**Rails.**—The demand for Rails during the week was inactive, and no sales worthy of mention have come to our notice. We quote: Steel, at mill, \$50; and Iron, \$47 @ \$48.

**Old Rails.**—Beyond a somewhat improved inquiry, there is little change in the situation. The market for old material is in a very unsettled condition, and is in that peculiar position where a buyer would find it difficult to shade the asking price, and where an urgent seller would be obliged to yield considerably in order to realize. Sales are reported of about 1000 tons Double Heads at \$28 to arrive, since which bids at the same price have been made and declined, sellers asking \$29. We quote, T's, \$27.50 @ \$28, and D. H., \$28.50 @ \$29.

**Scrap.**—There is little or no demand for Wrought Scrap, and if any sales have occurred during the week the particulars have been withheld. No. 1 Wrought, from yard, is quoted at \$30; and to arrive, about \$28.

## METALS.

**Copper.**—Since our last report the market has relaxed into a dull mood, sales made of Lake probably not exceeding 300,000 lb, at 18 @ 18 1/4. There is a rumor that some Lake sold as low as 17 1/4. In England the market has been steadier, at £70 for Best Selected and £63. 10/ for Chili Bars. Per mail we receive the ensuing about the statistical position: "London, April 8.—The total stock on the 31st ult. is said to be 53,030 tons, against 54,049 tons at the end of the previous month, or a decrease of 1019 tons for the month of March. The stock of Chilean and Bolivian produce in first and second hands in Liverpool and Swansea, on the 31st ult., is reported at 24,293 tons, against 25,932 tons on the 15th ult., or a decrease of 1639 tons. The imports of Chile produce during the last half of March were 207 tons, against 773 tons for the same time last year; while the deliveries were 1846 tons, against 825 tons for the similar periods; and the imports of other kinds of copper during the latter fortnight in March were 857 tons, against 545 tons for the corresponding time of last year, and the deliveries 1094 tons, against 1039 tons." By cable we are reported ourselves to-day as under: "During the week the market has been depressed, but has now recovered a little, though far from being strong. Best Selected, £70 @ £71, and Chili Bars, £63. 15/ @ £64. 5/." Manufacturers have made no change in prices. They quote: Bottoms, 31¢ @ 32¢; Braziers, 30¢ @ 36¢; Circles, 33¢ @ 36¢; Sheathing, 28¢, and Bolt Copper, 30¢; Segment Sheets, 33¢; Fire-box ditto, 30¢.

**Tin.**—London has fluctuated again during the week most violently, declining with Straits to £88, advancing to £100, and this morning it had receded to £96. 10/. It seems that prices in that market change from hour to hour, and under these disturbing influences no wholesale business has been done here. The jobbing trade is, however, represented as being fair. Our market gave way to about 2 1/2¢, with Straits Tin; to-day's nominal value is 2 1/2¢. Singapore receded last week to \$30 1/2 picul; since then we hear nothing from that quarter, but the Billiton Government sale, which took place at Batavia yesterday, when 13,000 piculs were disposed of, averaged 67.56 guilders @ picul, the parity of which, cost and freight, is £100, against 77.25 guilders at the February sale. About the statistical position we receive per mail, London, April 8, the following: "A tolerably good business is being done for consumption, the deliveries last month being reported as 1679 tons, against 1463 tons in February. The stock is said to have increased by 979 tons, being on the 31st ult. estimated as 16,875

tons, against 15,896 tons at the end of the previous month. The shipments from Straits to London during March are stated to be 525 tons; from Australia, 1075 tons; from Straits to America, 725 tons. The stock of Banca in Trading Company's hands and afloat is estimated as 2898 tons." Per cable we receive, this afternoon, the following dispatch: "The downward tendency of prices received a check during the week and prices advanced now a little, but have fallen off again and are weak. Straits Ingot, spot, £96 @ £96. 15/." Lamb and Pig we quote, nominally, at New York, 24 1/2¢ @ 25¢. Tin Plates.—The market still continues weak and unsettled, and buyers, as a rule, are holding off, unless where special concessions can be obtained. We quote toward the close, large lines, ordinary brands, per box: Charcoal Bright, \$6 @ \$6.25; ditto Ternes, \$5.25 @ \$5.50; Coke Tin, \$5.05 @ \$5.15, and ditto Ternes, \$5.12 1/2. Liverpool quoted yesterday, Coke, 15.3 @ 15/6, and Charcoal, 19/ @ 20/. We receive from London to-day: "The market is unsettled and quotations are nominal."

**Lead.**—The market here has been excessively dull and quiet during the week at \$4.95 @ \$5, which remains the closing quotation. Refined has also been inactive at \$5.05 @ \$5.10, with a few sales at the latter figure. St. Louis is about as flat as it can be at \$4.55 for hard and \$4.70 for soft, with 38¢ freight to New York. From London we receive ourselves, to-day, the following: "There is but little demand and tendency of prices in buyers' favor. Common English Pig, £14. 10/ @ £14. 17/6." Manufacturers have been subject to no change since our last. We quote: Pipe, 7 1/2¢; Sheet, 8¢; Tin-lined Pipe, 15¢, and Block, 45¢; all less 10¢ to the trade.

**Spelter and Zinc.**—Domestic Spelter has been rather duller and easier; it cannot be quoted any better than 5 1/2¢ @ 5 3/4¢, whereas Silesian remains steady at 5 3/4¢ @ 5 1/2¢ nominally. From London we are cabled to the following effect: "The market is dull and prices unsteady. Ordinary, at shipping ports, nominally, £16. 17/6 @ £17." We quote Bertha Refined, 8¢, and Bergensport, 9 1/2¢. Sheet Zinc has been moderately active at 7 1/4¢ @ 8¢.

**Antimony.**—A fair jobbing trade is transacting. We quote Cookson, 14 1/2¢ @ 14 3/4¢, and Hallett, 12 1/2¢, nominally.

## COAL.

Discontent in the Coal trade is as strongly marked as at any time this season. Dullness prevails and prices are not satisfactory. While the large Anthracite operators would not willingly admit that there is much cutting, they nevertheless confess that sales are governed more by circumstances than by circular rates; that is to say, operators and dealers do business each one for himself, on the best terms possible. It is affirmed, however, that the big concerns stand up generally pretty firmly to the circular prices. Business is less favorable than one year ago in this respect; that it is more of the "hand-to-mouth" description; dealers are not filled up with orders ahead, yet shippers are about up to last year's figures, and, in some instances, are in advance. In Bituminous Coal, trade is inactive. For Clearfield the quotation is about \$4.50 per ton, while Cumberland is virtually out of the market, the miners having been out about two months, or since Feb. 15.

Freights to Boston are \$1.10; to New Haven, 50¢, and vessels are not so scarce.

The Philadelphia Ledger says: "This week there will be only three days' work at the mines, and a similar restriction has been resolved upon for the first and second weeks in May, and official notice given that there will be an equal restriction during the later weeks of May if necessary. Thus there will be three weeks of steady half-time working, with a probability of its continuance until June 1. This enforced restriction is absolutely necessary to keep the production of Coal down to anything like the demand for consumption. There is practically no demand for the domestic sizes of Coal, and the larger sizes, consumed mainly by steam users, seem only to be wanted to the extent that bare half-time production will supply."

The Pottsville Miners' Journal says: "The necessities of the furnaces and manufacturing create a market for all the Lump, Steamboat and Broken that can be produced on half time, but there is absolutely no demand for the domestic sizes."

## OLD METALS, PAPER STOCK, &c.

The purchasing prices offered by dealers are as follows:

Copper, heavy.....	10.15¢
Copper, light.....	10.15¢
Copper Bottoms.....	10.15¢
Yellow Metal.....	10.15¢
Brass, heavy.....	10.15¢
Brass, light.....	10.15¢
Composition, heavy.....	10.15¢
Lead, heavy.....	10.15¢
Tea Lead.....	10.15¢
Zinc.....	10.15¢
Pewter, No. 1.....	10.15¢
Pewter, No. 2.....	10.15¢
Wrought Iron.....	10.15¢
Light do.....	10.15¢
Stove Plate.....	10.15¢
Machinery do.....	10.15¢
Grate Bars.....	10.15¢
Electrotype plates.....	10.15¢
Stereotype plates.....	10.15¢
Small type.....	10.15¢

The prices current (prices paid by local dealers) for Rags, &c., are as follows:

Canvas, Linen.....	3 1/2¢ @ 4 c.
White Cotton, New.....	3 1/2¢ @ 4 c.
White, No. 1.....	3 1/2¢ @ 4 c







**Another Exhibition Company.**—The American Exposition of 1883 (limited), was incorporated at Albany on the 14th. The object of the concern is to conduct the business involved in holding in 1883 a great American Exposition or national or international fair, proposed to be held under the auspices of the American Agricultural Association. The



the property of being permanently magnetized. As regards the duration of the magnetism, M. Clémendot states that the magnets of the Gower, Bell and Ader telephones, made of this new steel several months ago, have thus far preserved their force. As in ordinary tempering, M. Clémendot thinks the new process produces an amorphism in the metal, and he points out that it will now be possible to graduate a temper by graduating the pressure applied. In experimenting with different steel, he finds those of Allevard always the best for magnetic purposes. Elliptical bars of steel seemed to take the pressure in all their parts, and showed a uniform fracture throughout. M. Clémendot's highly interesting discovery will, without doubt, open an entirely new field of study to electricians and metallurgists, and will prove inestimably useful in the arts.

#### PROCESSES OF TINNING.

Tin, though of no great practical use by itself, is admirably adapted for coating other metals and protecting them against the evil effects of oxidation. The four principal methods of plating, says Iron, are by the contact of molten tin with a scaled surface, by amalgamation, by immersion, and by the galvanic battery. In the first process, which is that more generally employed, the metal, well scaled with diluted sulphuric or hydrochloric acid, is raised to the temperature of the melting point of tin. It is then sprinkled with powdered rosin and plunged in a bath of metal, the surface of which is covered with melted rosin for preventing oxidation. Great skill is required in this operation, which succeeds equally well with iron, brass and copper. In the process of amalgamation, which is rapidly falling into disuse, a thin layer of a soft amalgam of tin with mercury is applied to the perfectly clean and dry surface to be covered; on heating, the mercury is driven off and the tin adheres. In tinning by immersion, the parts to be tinned, well cleaned, are plunged into one of the following liquors, raised to boiling point:

Ammoniacal alum	335	or	Bitartrate of potash	435
Boiling water	4000		Water	435
Protochloride of tin	31		Protochloride of tin	31

In the latter case, an ingot of pure zinc is immersed in the bath at the same time.

In tinning with the battery, the following bath is prepared :

In the latter case, an ingot of pure zinc is immersed in the bath at the same time.

In tinning with the battery, the following bath is prepared:

Pyrophosphate of potash.....	400	Parts.
Protochlorate of tin.....	150	
Water.....	650	

At the positive pole is an ingot of pure Banca tin, and at the negative an ingot of zinc. The following method has been recommended by Weigler: A bath is prepared by introducing chlorine into a concentrated solution of chloride of tin until it is saturated with this gas. The excess of chlorine is driven off by heating the solution, diluted with ten times its volume of filtered water. The articles to be tinned, scaled with dilute acid, polished with fine sand and rinsed, are suspended by zinc wires in the bath, connected with the battery, for 10 or 15 minutes. The disadvantages of this process are that the bath soon becomes charged with chloride of zinc, and the tin salt requires frequent renewal. Hern proposes the following bath, in which the metals to be coated are to be immersed: Tartaric acid, 62 grams. (2 oz. 3 dr.); water, 3 liters (2½ quarts); soda, 90 grms. (3 oz. 3 dr.); protochloride of tin, 90 grms. (3 oz. 3 dr.)

#### INDUSTRIAL ITEMS.

##### NEW HAMPSHIRE.

A contract has been made for the erection of steel works at Franconia, within 90 days, to make steel by the petroleum hot blast.—*Boston Commercial Bulletin.*

A casting, weighing nearly 4500 pounds, was poured at Ellis's Foundry, in Keene, a few days ago, which is the heaviest casting ever made in Keene.

##### MASSACHUSETTS.

The Clinton Wire Cloth Company, of Clinton, now claim to be the largest wire weavers in the world, having enlarged their capacity greatly during the past year, and being still engaged in adding to their plant. They are making a specialty of wire cloth, for the production of which they employ one mill steadily running day and night.

There will probably be another twist-drill manufactory established at New Bedford. The capital stock, \$200,000, is reported as subscribed.

The Mason Machine Works are now employing 940 men, the largest number they ever employed. They are making some additions to their works.

##### CONNECTICUT.

The Corrugated Metal Iron Company, at East Berlin, have nearly completed two large buildings, to accommodate their largely increasing business. They are also putting in new machinery. They have been awarded the contract for the new iron bridge across the Merrimack River, at Lowell, Mass., consisting of five spans of 155 feet each—a roadway 37 feet wide and two 7-foot walks—working capacity, 4700 pounds to the linear foot. The bridge will cost \$82,000, will take 800 tons of iron, and is to be completed in six months.

##### NEW YORK.

The standard portable forges and the hand blowers made by the Buffalo Forge Company, of Buffalo, have met with such a good reception by the trade ever since their introduction, that the steel pressure blower, now placed on the market by the same company, has found no difficulty in recommending itself to the public. The manufacturers claim a special adaptation of the blower for the use of iron foundries and machine shops, not only in durability and workmanship, but in several points of construction, notably in the journals, journal bearings and oiling device, by which oil is prevented from working into the pulleys and belts. The shafts are made of the best steel, and the blast wheel of best composition brass and galvanized iron. The different parts are held together by bolts, and the simple construction allows repairs, when necessary, to be made by any mechanic, thus avoiding the necessity of sending back the apparatus to the makers. The blower embodies all desirable features, and the long experience of the Buffalo Forge Company in this direction

has undoubtedly greatly assisted in producing so perfect a contrivance.

##### PENNSYLVANIA.

Oxford Furnace has gone into blast. The tank furnace of the Woodbury Glass works is said to be the largest ever built, and has a capacity of melting six tons of glass every night.

What will be when completed one of the finest establishments in this country, is the New Powelton Furnace, at Saxton, Bedford County. It is owned by Robert Hare Powell, of Philadelphia, well known for his various enterprises in coal and iron. The stack is 70 feet high, with bosh lined at present for 18 feet, that can be made 19½ feet. There are three Whitwell stoves, each 70 feet high and 18 feet diameter; 1000 horse-power engine made by the Reading Iron Works. A stack 192 feet high carries off the gases from the stoves; 24 boilers, each 32 feet in length, make all the steam that will be needed. About five miles of railroad has been laid, to facilitate the handling of ore, coke and limestone that is found within an easy radius of two to three miles. Ores to be used are the local ores that abound, mixed with hematite to be developed, and some foreign. Coke is from Broad Top coal, made in 105 improved Belgian ovens. It is considered possible that good foundry pig can be turned out for \$12 per ton or less. There are foundations laid for another furnace to be erected in the near future. An expenditure of \$340,000 has already been made, and it is expected that an additional \$50,000 will complete the enterprise. Everything that science can suggest, or money obtain, has been done to make this a practical business success. It is hoped to make the first run by the 4th of July.—*Coal Trade Journal.*

The air shaft of the Connellsville Coke and Iron Company will be completed within the next 30 days; 54 diggers are now employed, and 50 of the 200 ovens are running 72-hour coke. When the air shaft is completed the force of diggers will be increased to 70, and the entire plant will be run to its fullest capacity.

It is reported that C. R. Scull, of Phoenixville, has purchased 56 acres of land from Robert Christman, at Phoenixville. A large proportion of this land is a meadow adjoining the Schuylkill River, upon which it is said Mr. Scull intends building an iron works of some kind, whether a stove foundry or an iron-manufacturing establishment is not known.

The new rolling mill of Messrs. Bailey & Shoemaker, at Pine Iron Works, Berks County, is about ready to start up.

The Lebanon Pipe Mill, situated at the eastern end of that borough, has been idle for many years, but will probably be started up soon. Mr. Robert H. Coleman has just purchased the controlling interest in the stock, and it is said he means to have the mill in operation as soon as it is practicable. Spring City citizens have decided to organize the Spring City Iron Foundry, with a capital stock of \$20,000, at \$50 a share, to take the place of the Keeley Stove Works, which are to go to Columbia. A committee to solicit subscriptions is meeting with success, and in a few days all the stock will be taken.

We hear that, owing to the completion of all contracts and the absence of new orders for iron rails, the puddling department of the Allentown Rolling Mill Company will suspend operations some time this week, and as a consequence the employees will have to stand idle or seek work elsewhere. The rail mill of the company has been standing idle for a month, while in the Glen Mill, also owned by the said company, work was suspended two weeks ago. After this week, of all the various departments of the corporation, only the Little, or Lehigh Mill, which runs on merchant iron, will be in operation. The stack of the new furnace Ella is the tallest in the Shenango Valley, with perhaps one exception, that of the Kosena, at New Castle.

An official report states that there was constructed at the car shops of the Reading Railroad Company, in Reading, last year, 2 eight-wheel passenger cars, 796 coal cars, 297 gondola cars, 180 horse cars, 12 refrigerator cars, 50 stock cars, 30 trucks for oil tanks, 1 cabin car, 9 four-wheeled cabin cars—1350 in all. More cars were needed and more would have been built but the material necessary could only be procured with the greatest difficulty. Twenty-five of the Centennial passenger cars have been fitted up as first-class cars, at a cost of \$1552. All the merchandise cars have been loaded to an overweight, and the capacity of the coal cars is only limited by the quantity of coal that can be placed on them. Increased shop facilities are absolutely needed for construction and repairs of rolling stock, especially for the locomotive department at Reading.

The Duncannon Rolling Mill, which was recently destroyed by fire, has been rebuilt and is again in operation. Shawnee Rolling Mill, near Columbia, has gone into operation.

##### PITTSBURGH AND VICINITY.

Lucy Furnace No. 1 has gone out of blast to be relined.

James B. Young & Co., manufacturers of rolls, have orders ahead to keep them busy for three months. They have just finished a new office and an addition to their foundry, 90 by 40 feet.

Both the blast furnaces of Shoenberger & Co. are in blast.

Oliver Bros. & Phillips are extensively improving their Woods Run mill. All the boilers are being repaired, a large new fly-wheel is being put in for the muck rolls and bar mill, the muck rolls have been torn out and a new foundation is being put under them, and a general repairing all around is going on. It is thought work will be resumed in about two weeks.

Messrs. Rees & Co. have received orders for the engines for two of the Western-river type of steamboat, to be built in Russia.

J. Painter & Sons are putting up 16 additional puddling furnaces at their mill, which will increase the present number to 68 furnaces.

The Lewis Foundry and Machine Shop, corner Tenth and Neville streets, south side, have purchased the McKee property, which fronts on Bingham street, and will erect an addition to their present works. Negotia-

tions are also pending for the purchase of the Wallace property, corner Tenth and Bingham streets. The work of demolishing the present building will be commenced in a few days.

A new spike-cutting machine, invented by the late Andrew Kloman and perfected by his successors, has been put in operation at the Superior Mill, Allegheny. It is a great success, and turns out a fine grade of spikes at the rate of 60 a minute.

Miller & Co. are putting up their forge building at Mills Station, and after completion about 150 men will be given employment.

Furnace D of the Edgar Thomson Steel Works has been completed and blown in. OHIO.

The Queen City Forging Company, of Cincinnati, have, within the past six months, supplied their works with a number of improved tools, among which are several milling machines made by the Pratt & Whitney Co.; two 13-ton hammers are now in operation, and preparations are being made for the erection of four more of the same size, and for a Bradley hammer of large dimensions. The specialties of these works are fifth wheels, carriage ring bolts and fifth-wheel heads. Considerable activity is at present experienced at the works, and extensions of the same will probably soon be made.

The Jefferson Iron Works, Steubenville, have contracted with the Centre Foundry and Machine Company, of Wheeling, for four additional nail machines, which will increase their plant to 102 machines.

The Sarah Furnace, Iron-ton, was blown out this week. It is to have a new lining and be thoroughly overhauled.

Messrs. Stoehr, Keech & Co., of Pittsburgh, will commence next week the erection of a table glassware manufactory at Massillon. The inducements offered by its citizens are 1½ acres of land and \$6000. The works will be situated near the rolling mill.

The work of erecting the McDonald shield at the puddling and heating furnaces of Brown, Bonnell & Co., Youngstown, is going forward and will soon be supplied them. They will add much to the comfort of the employees by preventing the heat from the furnaces striking them. Several other mills there have in contemplation the securing of the shields for their furnaces.

The Brilliant Glass Co., at Brilliant, Jefferson County, whose works were recently destroyed by fire, have completed their new factory, and began making glass on April 11. The glass, which had been in the pots for 10 weeks, came out as clear and brilliant as possible, which is something very remarkable. In the construction of their new buildings they have made many improvements, which give them several advantages they did not possess before, and which will enable them to turn out ware much more quickly than formerly.

The Diamond Glass Co., Urichville, has been incorporated with a capital of \$40,000.

The work of converting the old Swartz factory, at Martin's Ferry, into a suitable factory for the New Union Glass Co. is proceeding.

The Lake Shore Rolling Mill was closed on Wednesday by the Cleveland Rolling Mill Co., owing to a demand for higher wages by the men, some 50 in number.

There is a prospect of Norwalk having glass works and a rolling mill.

The project of erecting a large stone coal furnace and a 100-machine nail mill at Iron-ton has fallen through.

Benwood Furnace made last week 420 tons of good iron. The furnace is 51 x 12½ feet.

We hear that 10 new puddling furnaces have been added to the mill of the Aetna Iron and Nail Co.

Should a pooling arrangement, as is reported, have been made between the Columbus, Hocking Valley and Toledo and the Ohio Central railroads, by which the cutting of rates on coal will cease, the control of the Hocking Valley is secured to the Standard Coal and Iron Company. This would insure the ratification of the bargain for the transfer of the Akron Iron Co.'s furnace and coal and iron lands at Buchtel to the Standard Coal and Iron Co., and in that case, Miller & Buchtel's new malleable iron works at the crossing of Main street by the N. Y. & P. & O. and C. & C. railroads, will be a sure and big thing.—*Akron Beacon.*

##### WEST VIRGINIA.

The Belmont Furnace is banked up, and repairs are being made on the machinery.

The mill of the Kloman Iron and Steel Co., at Moundsville, will probably start up again this week, having received a supply of metal.

##### ILLINOIS.

Furness Bros. are building 10 more nail-plate feeders for the Riverside Iron Works of Wheeling, W. Va.

On the night of the 9th inst. a portion of the main building of William Deering's Marsh Harvester Works, at Lake View, was destroyed by fire. This building was 470 feet long, 60 feet wide and three stories high, although the section of the building burned was exactly in the middle, and was 130 x 60 feet. The first floor, which contained machinery, the second, where was kept a large stock of patent binders, and the third, which was used as a paint shop, were totally destroyed, involving a loss of about \$35,000 on stock and \$12,000 on building, which is fully covered by insurance. A full force of men have been constantly at work rebuilding, and it is expected that the entire works will be in running order within a few days.—*Chicago Industrial World.*

A cutlery establishment now being started at Morris will employ 30 men.

The Chicago Scale Works are adding more machinery to their works, and will soon increase their manufacturing facilities by the erection of new works.

##### ALABAMA.

The Birmingham Rolling Mill Company are doing a large business, and are running exclusively on pig iron manufactured in Alabama. The mill turned out an exceptionally large product during the six days ending April 18th, the 16-inch bar mill during that time turning out, on single turn, 142 tons, and the small mill (3-inch), 69 tons first-class iron.

Sloss Furnace No. 1 has blown in, and is doing very nicely. The erection of No. 2 has been commenced.

##### MICHIGAN.

The Carp River Iron Company have determined to relight the fires of the Pacific Furnace, and will proceed forthwith to put her in order to blow in on coke fuel.

##### MISSOURI.

The works of the Groom Shovel Company, of St. Louis, badly injured by fire on April 12th, started up every wheel, with full force of men last week. Only 5½ days' time were lost. The machinery and stock were fully insured.

The Central Union Brass Works, of St. Louis, are making a number of important additions to their works.

#### The Service of the St. Gothard Tunnel.

A recent issue of *Engineering* contains the following account of the service of the St. Gothard Tunnel:

The special staff detailed to superintend the working of the St. Gothard Tunnel consists of an inspector (*Bahnmeister*) residing in Göschenen, and an assistant inspector residing at Airolo, 2 pointsmen, one at each station, 4 entrance watchmen, 8 tunnel watchmen, 4 skilled and 12 ordinary workmen. Every morning at 1.10, a tunnel watchman leaves Airolo and another starts from Göschenen. Each is provided with a leather bag of exploding signals, a hammer, a bolt wrench, a lantern for hand signals, and a book in which his station-master has noted the hour when he set out. The two men meet in the middle of the tunnel, remain there for an hour or two, note in their books the hour of setting out to return, and exchange them. On reaching the station the book is handed over to the station-master, who marks in it the hour of arrival, and sends it back to the other station by the next train. Eight hours are allowed for the whole expedition. Other pairs of tunnel watchmen set off at 6.50 p. m., 12.10 noon, and 8.25 p. m., so that the whole tunnel is constantly patrolled. Each watchman writes a short report in his book on every round, and anything remarkable is to be at once reported to one of the inspectors. The entrance watchmen are on duty for 12 hours; their business is to prevent any one from entering the tunnel except on proper business, and—in combination with the pointsmen—to survey the rails from the tunnel mouths to the station of Airolo on the one side, and the bridge over the Reuss on the other. At every kilometer inside the tunnel there is placed a numbered lantern. It has not been thought necessary to adopt any special means of ventilation. It is in contemplation to light the engines and carriages by means of electricity. The speed of the trains is controlled by hand brakes, pending the decision between the various systems of continuous brakes. Trains are not allowed to pass through the tunnel in less than 40 minutes, although the journey can be safely performed in 25 minutes.

**The Austrian Lead Mining Industry.**—We are informed that the "Berg- und Huettenmaennische Verein fuer Steiermark und Kaernten" has recently presented a petition to the Austrian Government demanding an appropriate duty on imported lead, for the protection of the Austrian lead mining industries. It is claimed that during the past ten years the annual output of lead has increased from 34,000 cwt. to 60,000 cwt., this quantity fully satisfying the existing demands of the country. Notwithstanding this fact, steady and constantly increasing importations have been made, resulting in a material reduction of the prices of the home supply, besides overburdening the market. Considerable quantities of lead are now on hand, a great proportion being in the possession of the Bleiberg Union Company. This excess of supply over demand is, moreover, in a great measure due to the fact our own country is now prepared to furnish large quantities of the metal, amply sufficient for all purposes, thus cutting off one of the most profitable sources of imports of Austrian producers. The latter, therefore, deem it advisable to put a high duty on imported lead, by which measure, it is generally thought, the prosperity which characterized this branch of industry during former years will be speedily brought back.

**Peculiar Crystallization of Potassium Chloride.**—Mr. E. Claassen recently had occasion to make use of extract of wormwood or absinthe, and was surprised to find in the liquid many perfectly transparent and almost colorless crystals, very regular in form. The largest were about ¼ inch in diameter, and weighed 130 mg. (about two grains). By studying their crystallographic form, it was found that they belonged to the isometric system; one crystal was a cube, with the angles slightly replaced with octahedral planes, the others being combinations of the octahedron and cube, with either a predominant octahedron or with no predominance of either of the forms. Several of the last-mentioned crystals show, however, very nicely and distinctly, besides these forms, the icosaicahedron 2-2 (202). By chemical analysis it was found that the crystals were potassium chloride. This salt is commonly found in cubes, and the uncommon forms described are, perhaps, due to the presence of organic substances in the wormwood extract.

**Malleable Nickel.**—In a recent article on malleable nickel we mentioned several Germans as deserving credit for their commendable efforts in improving this article. This has provoked a letter from Messrs. Henry Wiggin & Co., of Birmingham, England, in which they call attention to their specimens of this metal, as well as of cobalt exhibited at the electrical exhibition in Sydenham. Messrs. Wiggin & Co. obtained a patent for their process of manufacturing malleable nickel and cobalt some two years since.

According to the annual statement of the St. Louis Markets Exchange for 1881, the total volume of business represented in tons

was as follows: Received by rail, 6,750,575; by river, 852,410; total tons, 7,602,985. Shipped by rail, 3,462,912; by river, 884,025; total tons, 4,346,937. The direct shipments from St. Louis to foreign countries, in tons, were as follows: By rail eastward, 91,727; by river to New Orleans, 389,587; total tons, 481,314. The shipments by river include, in addition to merchandise on through bills of lading, 12,861,124 bushels grain shipped by way of New Orleans. The shipments of bulk grain, by river from St. Louis to New Orleans, for export, amount to 12,993,947 bushels. Thus we have with tolerable exactness the size of the "diversion" during the period named of the improved large system. It is sufficient to load a goodly number of ships.

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Genuine have two Rubbers, Metallic Strip, Open Iron Handle, with "P. W. C. Co." cast in face, Name, Date of Patents, and Copyrighted Directions.



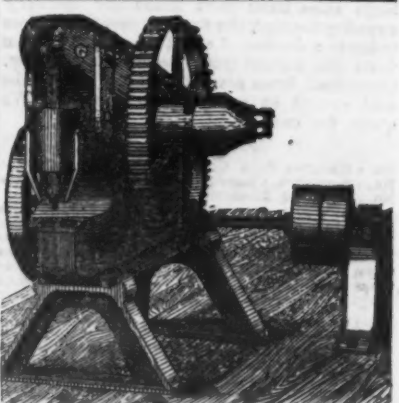
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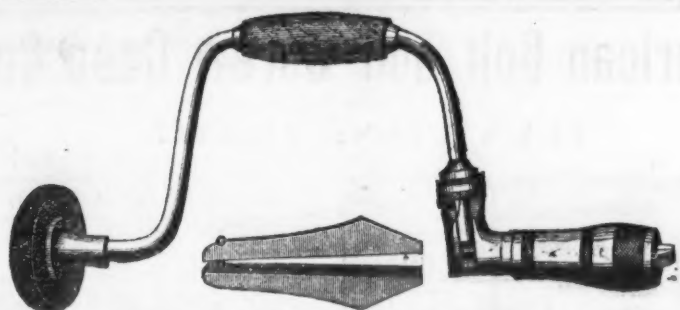
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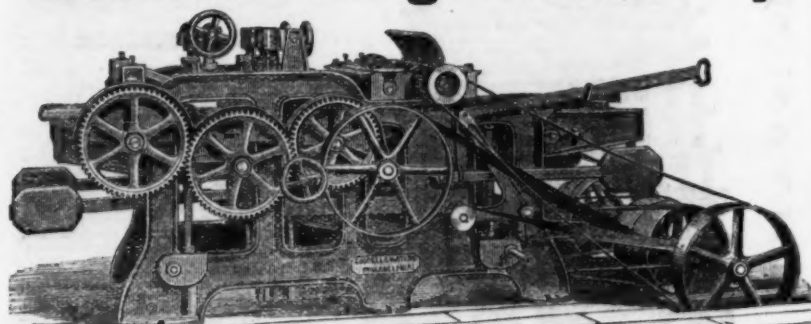
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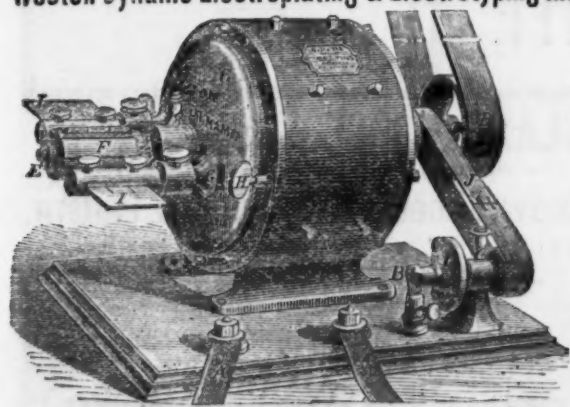
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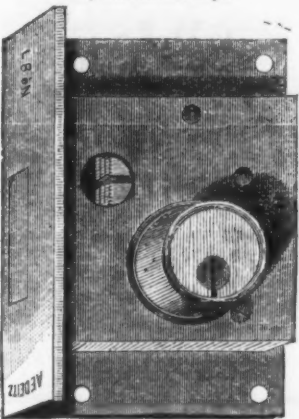
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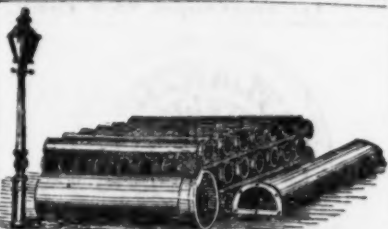
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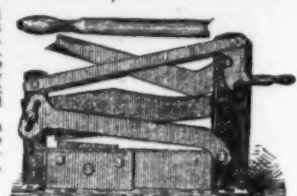
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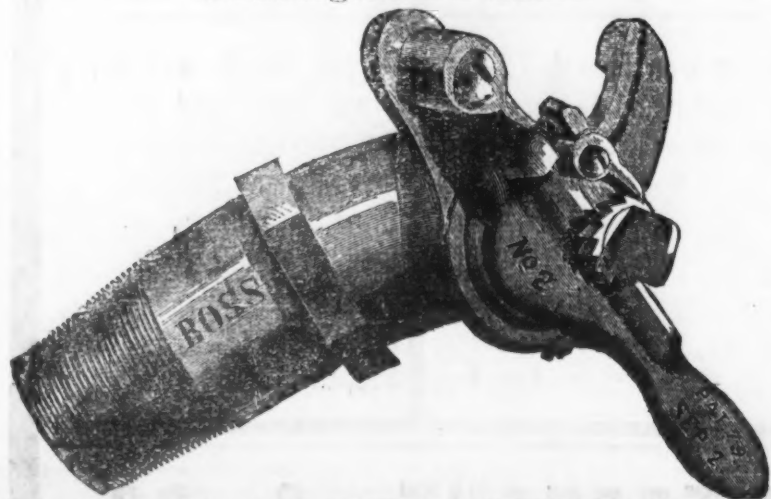
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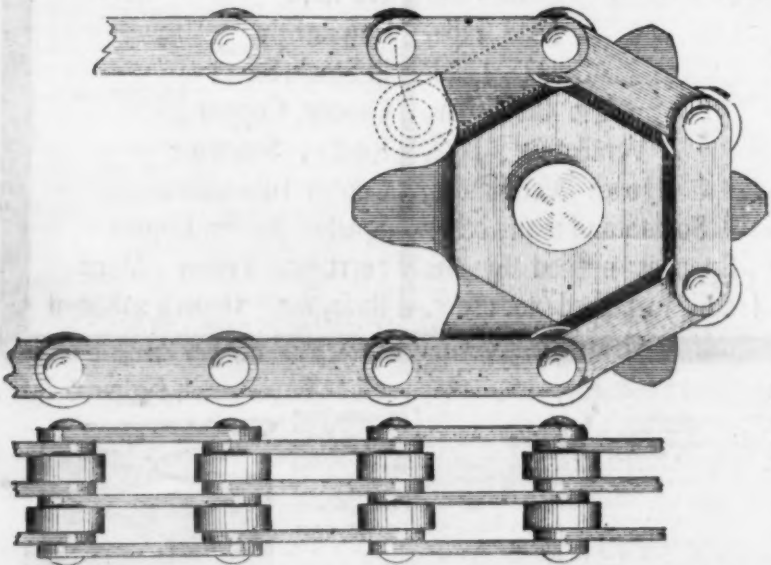
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**PUMP.**

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**DROP FORGINGS**  
**OF EVERY DESCRIPTION.**  
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Superior Work at Reasonable Prices.  
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With perforated strainer. It will squeeze the third more juice from a lemon than any other, also quicker.  
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Successors to W. R. Baker & Co.,  
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**SELF-LOCKING SCREW CASE.**

Made from the Best Gray,  
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This is not a Drawer Case. This structure has been purposely invented on account of trouble caused by a Drawer.

The Standard of This Case is a Hollow Cone, Firm as a Rock, on Which All Shelves Revolve.

All Shelves can be taken off and replaced in a few minutes. The ornamental front frames of each Circle, well protected, contain a piece of glass, whereby the dealer can see through all compartments in a minute, and if any number is out, can fill or if not in Stock, can order, which in a Drawer Case makes a great deal of trouble. The front frames can be taken out and replaced by anyone in no time, thus making it the most perfect structure ever placed upon the market. With beauty and strength combined, it surpasses even perfection in the highest state. You have no Drawers to take out or fit back. No mixing of Screws by customers helping themselves, as is the case with Drawers taken from the shelves; or still worse, when standing on the counter. No losing of Customers while looking through Drawers of mixed screws. In our case only one compartment is open at the time and the balance all closed. No one can get into the Case except the men behind the counter. Any number can be found instantaneously. By turning to the right, numbers increase, by turning to the left, decrease. All numbers are cast on the frames and gold-bronzed. If for superior to any structure made for the purpose, return to

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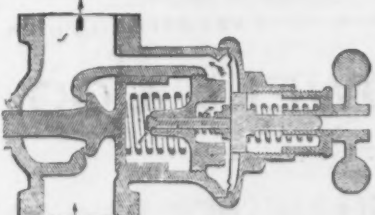
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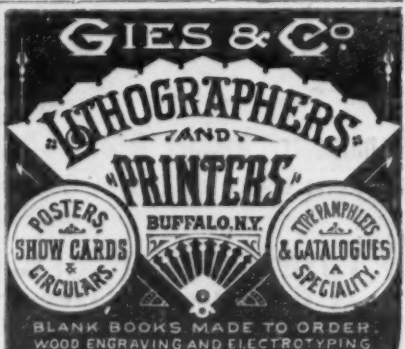
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**Curtis Pressure Regulator.**  
Is made entirely of metal; occupies the same space as a globe valve. It has no glands or packing, and is a lock-up valve. Write for circular. Manufactured by  
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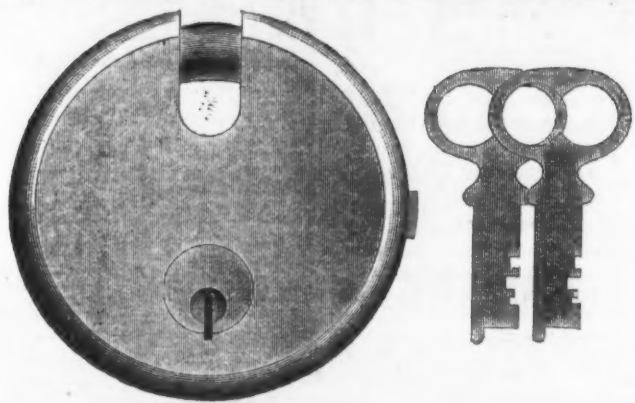


Shafting, Makers of.	
Cresson Geo. V., Philadelphia, Pa.	47
Poole & Hunt.	48
Rogers J. F. & Co., 107 Liberty, N. Y.	26
Seiers Wm. & Co., Phila. and 7 Liberty st., N. Y.	42
Shears (Sheep).	
Field Alfred & Co., 23 Chambers, N. Y.	17

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## SELF-LOCKING PAD LOCK

BY THE

## EAGLE LOCK CO.,

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It is made of wrought brass, and is furnished either brass or nickel-plated. It is novel in its construction, perfect in its operation and very secure. It is locked by a slight pressure on the projection shown on the right side of the cut.

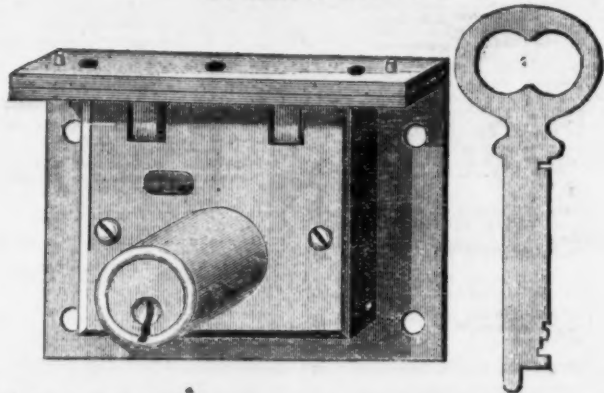
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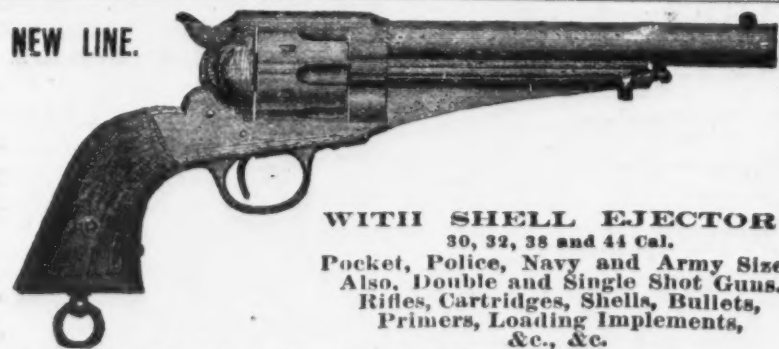
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WITH SHELL EJECTOR  
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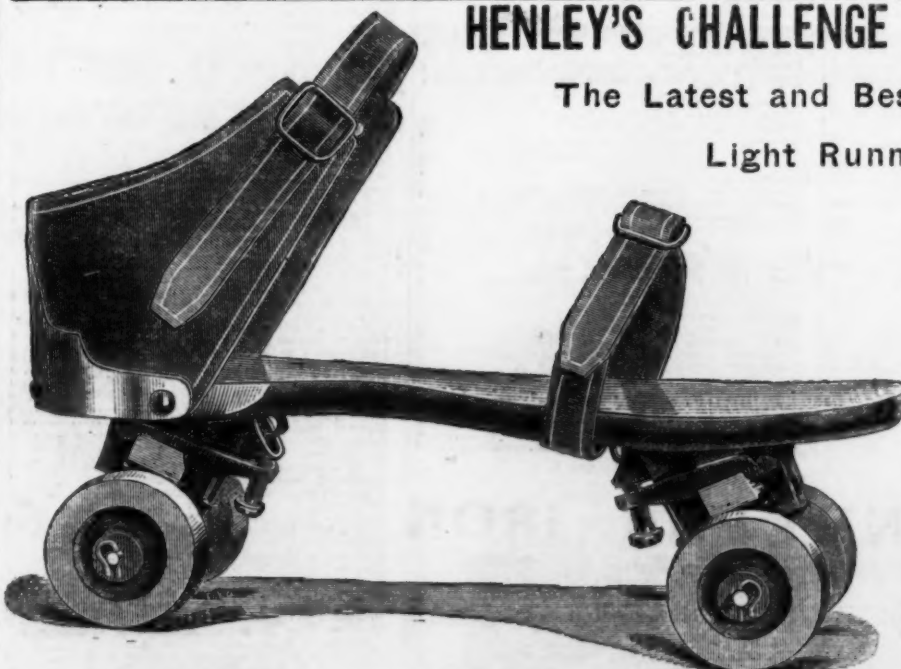
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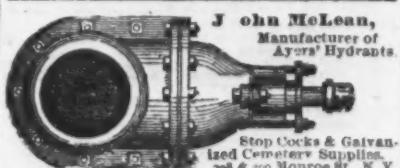
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"Superior in Every Respect."  
This is one of the best selling locks in the market, and affords the dealer a large profit. It is thoroughly and strongly made—of the best material—very hard, some in appearance, and every lock is warranted.

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THE BODY—is fitted with an adjustable Cast-Steel Jaw at the point where it comes in contact with the Pipe, which Jaw can be renewed at any time by simply removing one screw. By this system the wearing away of the Jaw (which in other cutters is the first part to give out) is effectually prevented, and this tool can be kept in first-class order at all times.

THE WHEEL BLOCK.—This is also of Steel, neatly fitted to its socket and cannot be dropped out. It is much more durable than the cast-iron blocks and is hardened at the point where the rod comes in contact with it.

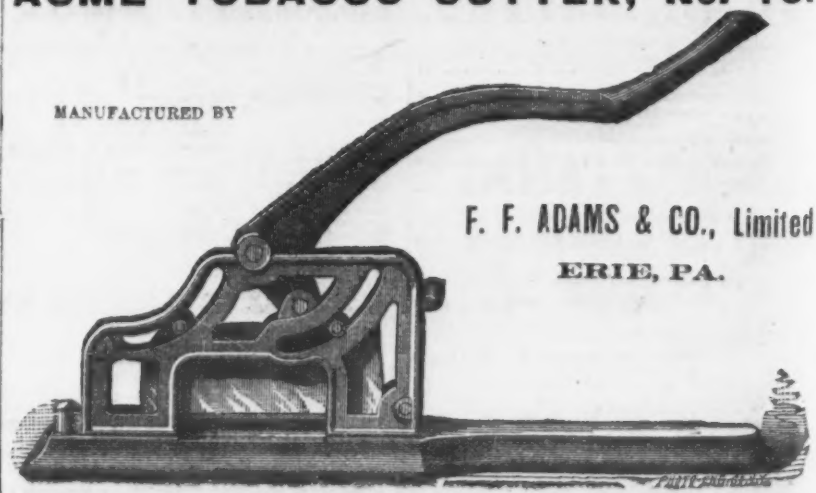
THE HANDLE—of this Cutter is put on to stay, and cannot be removed by the roughest usage, as it is an iron handle, cast fast to the Rod, operating the block.

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<b>Razor Straps.</b>	
Genuine Emerson.....	dis 60 @ 64
Badger's Emerson.....	dis 60 @ 64
Evans' Emerson.....	dis 60 @ 64
Initiation Emerson.....	dis 60 @ 64
Hunt's.....	dis 15 @ 20
Chapman.....	dis 10
Saunders.....	dis 10
Torrey.....	dis 10
<b>Rivets.</b>	
Iron and Tinned, new list, Dec. 10, 1881.....	dis 40
In bulk, new list, Dec. 10, 1881.....	dis 40
Copper Rivets and Bars.....	dis 35 @ 40
Nos. 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100.....	dis 40
<b>Rods.</b>	
Star, Brass.....	dis 25
Star, Black Walnut.....	dis 25
Star, American Patent.....	dis 25
<b>Rollers.</b>	
Burn Door, Sargent's list.....	dis 60 @ 100
Arne (Anti-Friction).....	dis 60 @ 100
<b>Rolls.</b>	
Mills' Net L. t. Oct. 5, 1881, dis on 4000 lb and over.....	dis 10
Manilla, 1/2 inch and larger.....	dis 10
Manilla, 1/4 inch.....	dis 10
Manilla, 1/8 inch.....	dis 10
Manilla, 1/16 inch.....	dis 10
Manilla, 1/32 inch.....	dis 10
Manilla, 1/64 inch.....	dis 10
Manilla, 1/128 inch.....	dis 10
Manilla, 1/256 inch.....	dis 10
Manilla, 1/512 inch.....	dis 10
Manilla, 1/1024 inch.....	dis 10
Manilla, 1/2048 inch.....	dis 10
Manilla, 1/4096 inch.....	dis 10
Manilla, 1/8192 inch.....	dis 10
Manilla, 1/16384 inch.....	dis 10
Manilla, 1/32768 inch.....	dis 10
Manilla, 1/65536 inch.....	dis 10
Manilla, 1/131072 inch.....	dis 10
Manilla, 1/262144 inch.....	dis 10
Manilla, 1/524288 inch.....	dis 10
Manilla, 1/1048576 inch.....	dis 10
Manilla, 1/2097152 inch.....	dis 10
Manilla, 1/4194304 inch.....	dis 10
Manilla, 1/8388608 inch.....	dis 10
Manilla, 1/16777216 inch.....	dis 10
Manilla, 1/33554432 inch.....	dis 10
Manilla, 1/67108864 inch.....	dis 10
Manilla, 1/134217728 inch.....	dis 10
Manilla, 1/268435456 inch.....	dis 10
Manilla, 1/536870912 inch.....	dis 10
Manilla, 1/1073741824 inch.....	dis 10
Manilla, 1/2147483648 inch.....	dis 10
Manilla, 1/4294967296 inch.....	dis 10
Manilla, 1/8589934592 inch.....	dis 10
Manilla, 1/17179869184 inch.....	dis 10
Manilla, 1/34359738368 inch.....	dis 10
Manilla, 1/68719476736 inch.....	dis 10
Manilla, 1/137438953472 inch.....	dis 10
Manilla, 1/274877906944 inch.....	dis 10
Manilla, 1/549755813888 inch.....	dis 10
Manilla, 1/1099511627776 inch.....	dis 10
Manilla, 1/2199023255552 inch.....	dis 10
Manilla, 1/4398046511104 inch.....	dis 10
Manilla, 1/8796093022208 inch.....	dis 10
Manilla, 1/17592186044416 inch.....	dis 10
Manilla, 1/35184372088832 inch.....	dis 10
Manilla, 1/70368744177664 inch.....	dis 10
Manilla, 1/140737488355328 inch.....	dis 10
Manilla, 1/281474976710656 inch.....	dis 10
Manilla, 1/562949953421312 inch.....	dis 10
Manilla, 1/1125899906842624 inch.....	dis 10
Manilla, 1/2251799813685248 inch.....	dis 10
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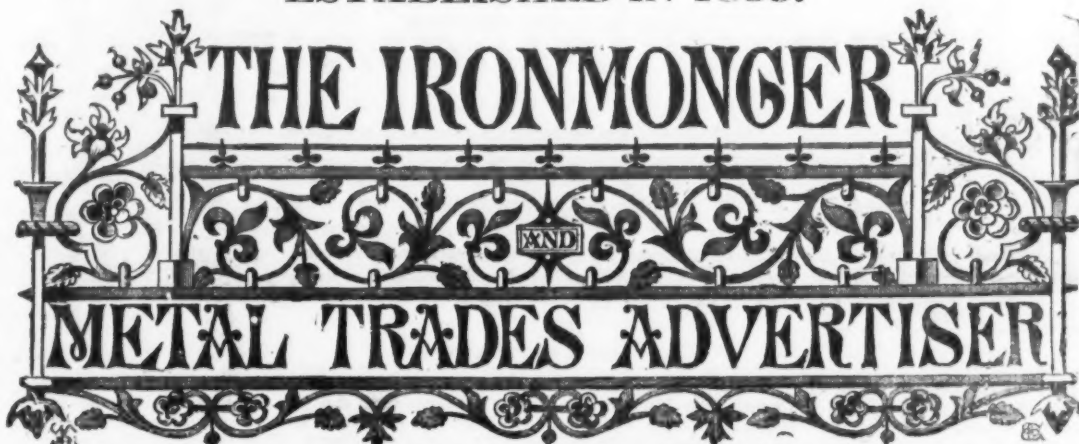
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Fig. 2.

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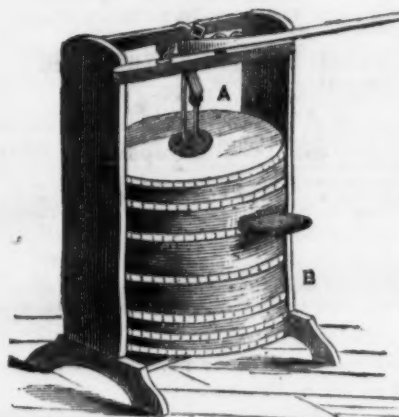
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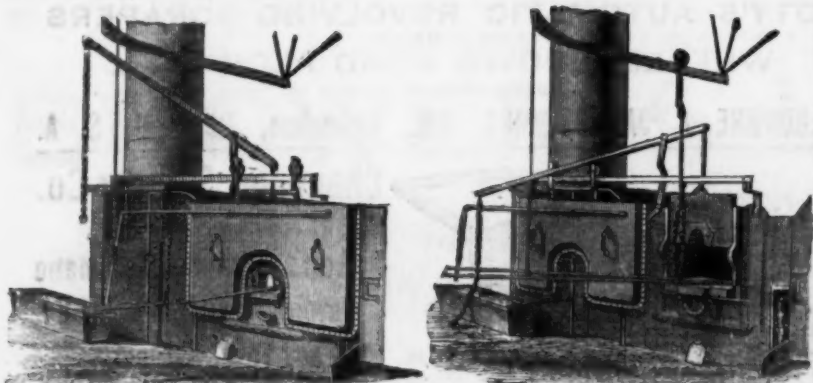
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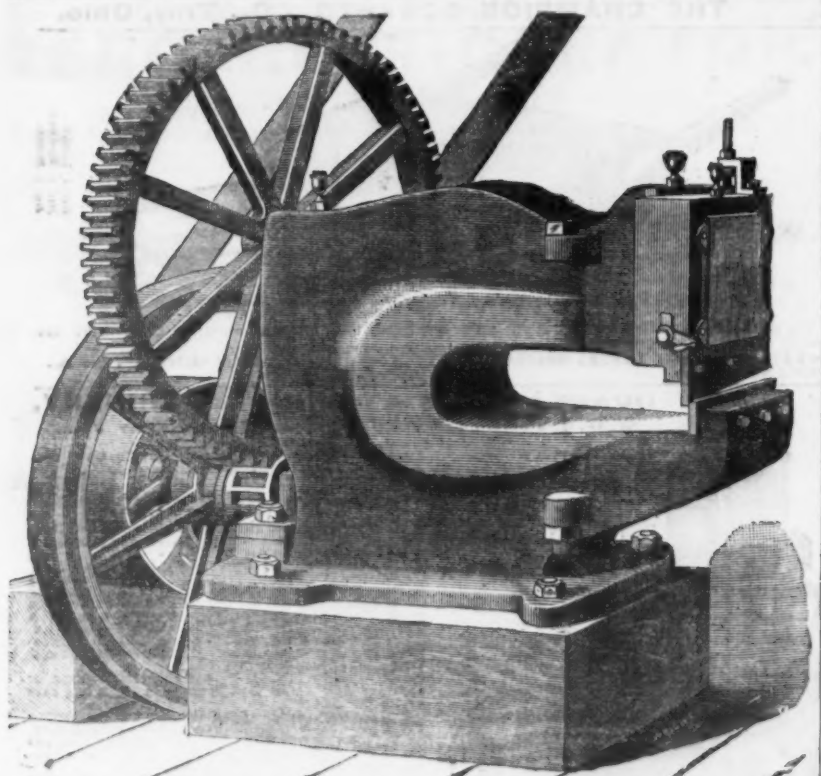


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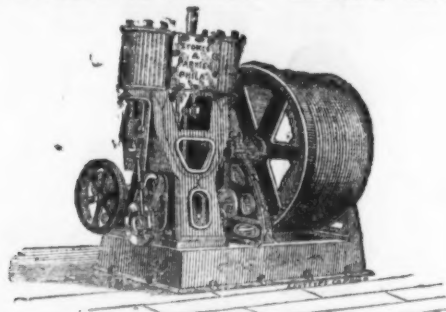
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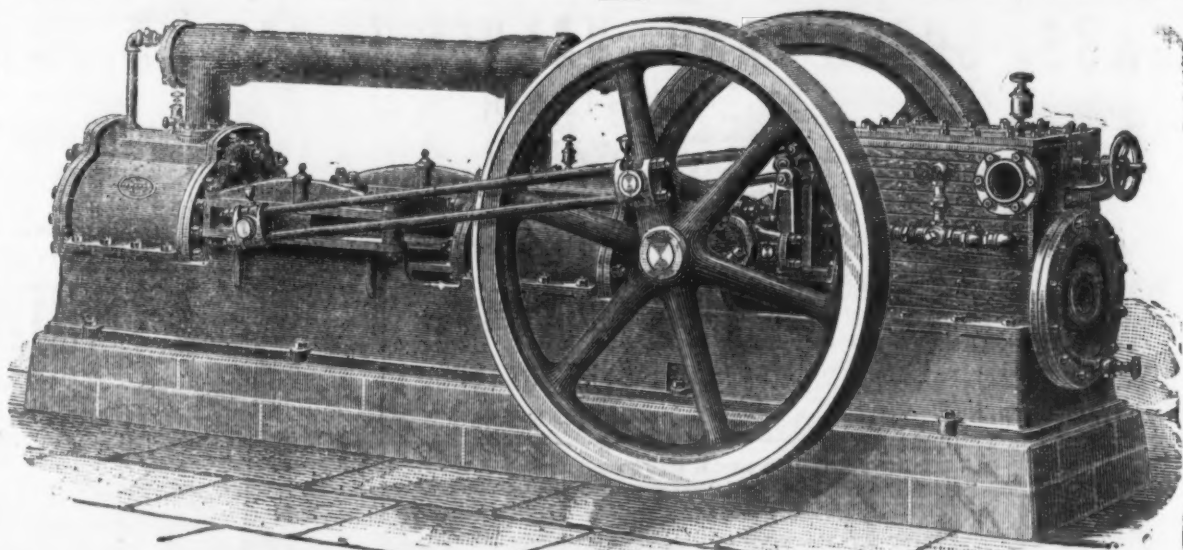
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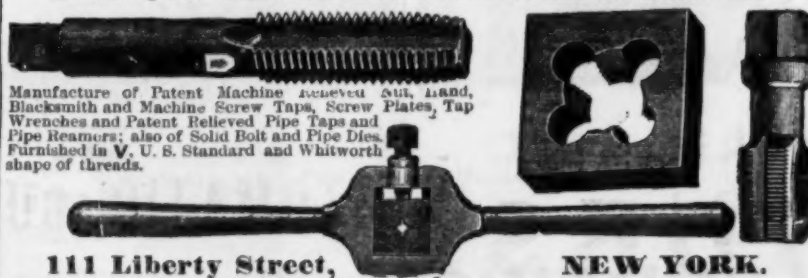
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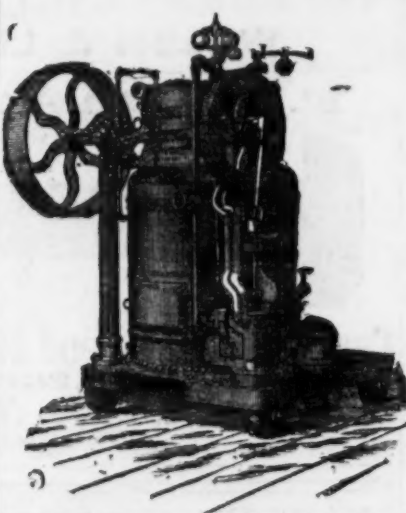
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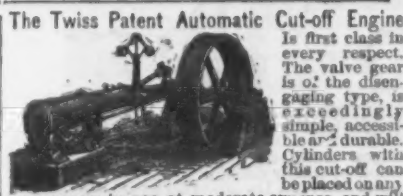
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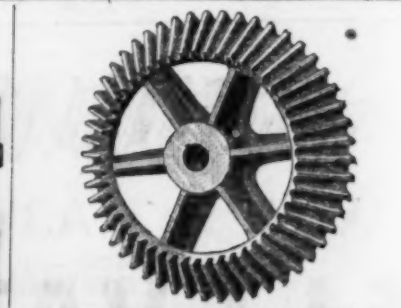
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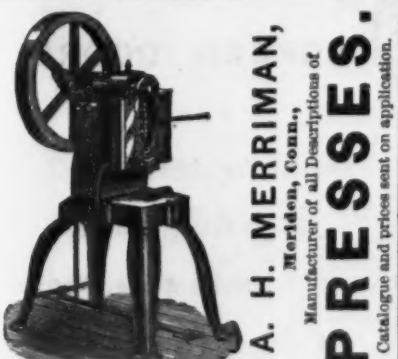
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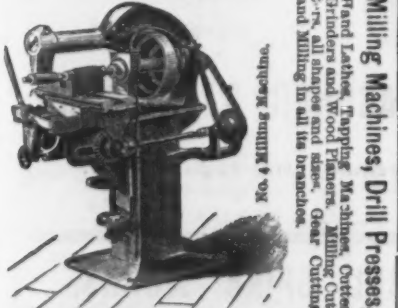
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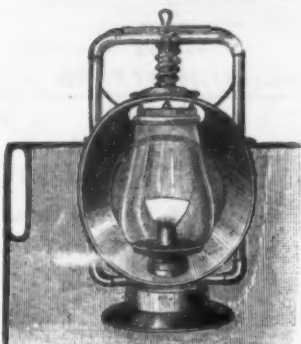
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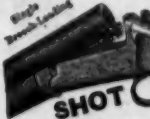
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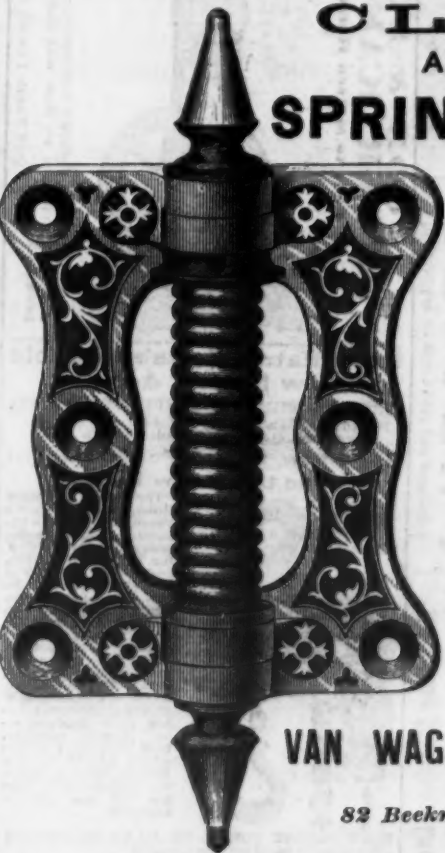
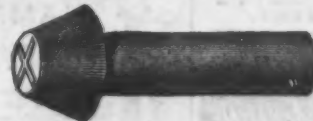
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